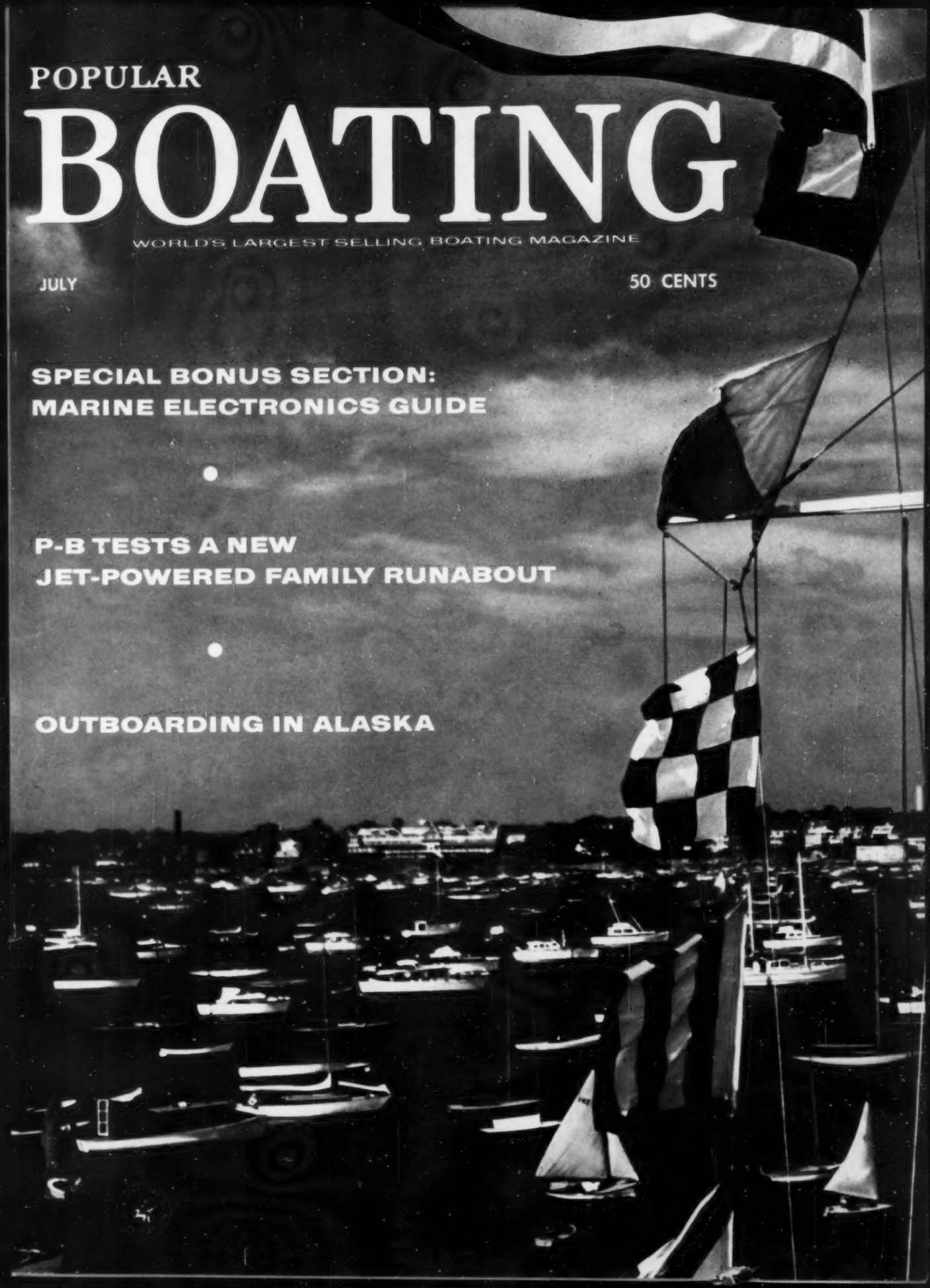
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BOATING
WORLD'S LARGEST SELLING BOATING MAGAZINE
JULY
50 CENTS
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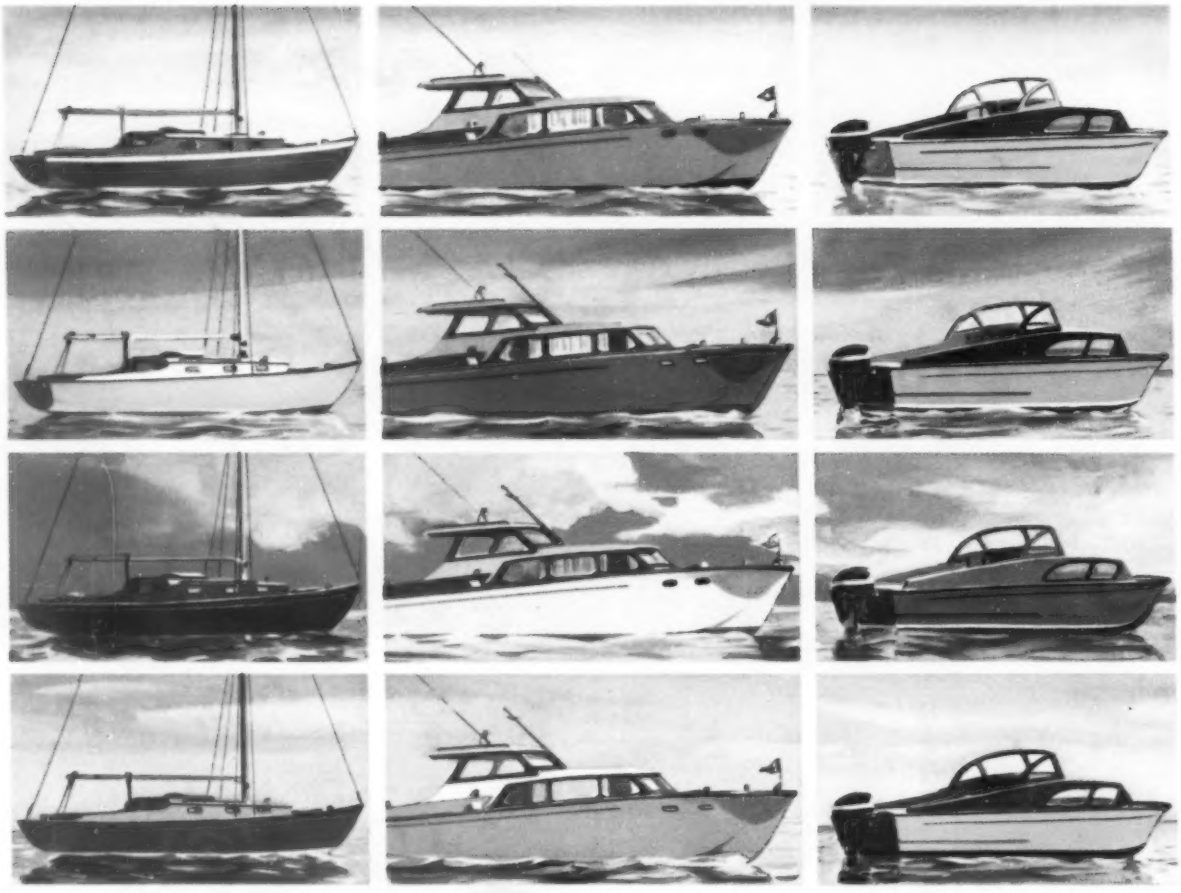
MARINE ELECTRONICS GUIDE
P-B TESTS A NEW
JET-POWERED FAMILY RUNABOUT
OUTBOARDING IN ALASKA



Here Are a Few of the Thousands of Striking Color Schemes You Can Get with the World's Biggest Selection of Marine Colors

WOOLSEY "CAWLUX NAUTICOLORS"

CHOOSE FROM 70 STRIKING NAUTICOLORS... for topsides, decks, cabins and interior surfaces. Only Woolsey offers this unequalled choice of lustrous, nautically correct colors for your boat, because only Woolsey brings you 22 popular, ready-mixed shades in dependable time-proven *Cawlux* Marine Finish *plus* 48 additional shades easily made by adding one tube of *Cawlux* Colorant.

CAWLUX NAUTICOLORS LAST THE SEASON! Paint once with *Nauticolors* and you're through painting for the year. *Cawlux Nauticolors* resist fading, checking and changing under the most rigorous exposure. Even gases and fumes won't discolor the gleaming finish. And, scrub as you will, your boat will *keep* that lustrous, freshly-painted look.

This year, try a modern color scheme on your boat with the only marine paint that offers you so many more different colors! See the beautiful *Nauticolors* of *Cawlux* Marine Finish at your Woolsey dealer.

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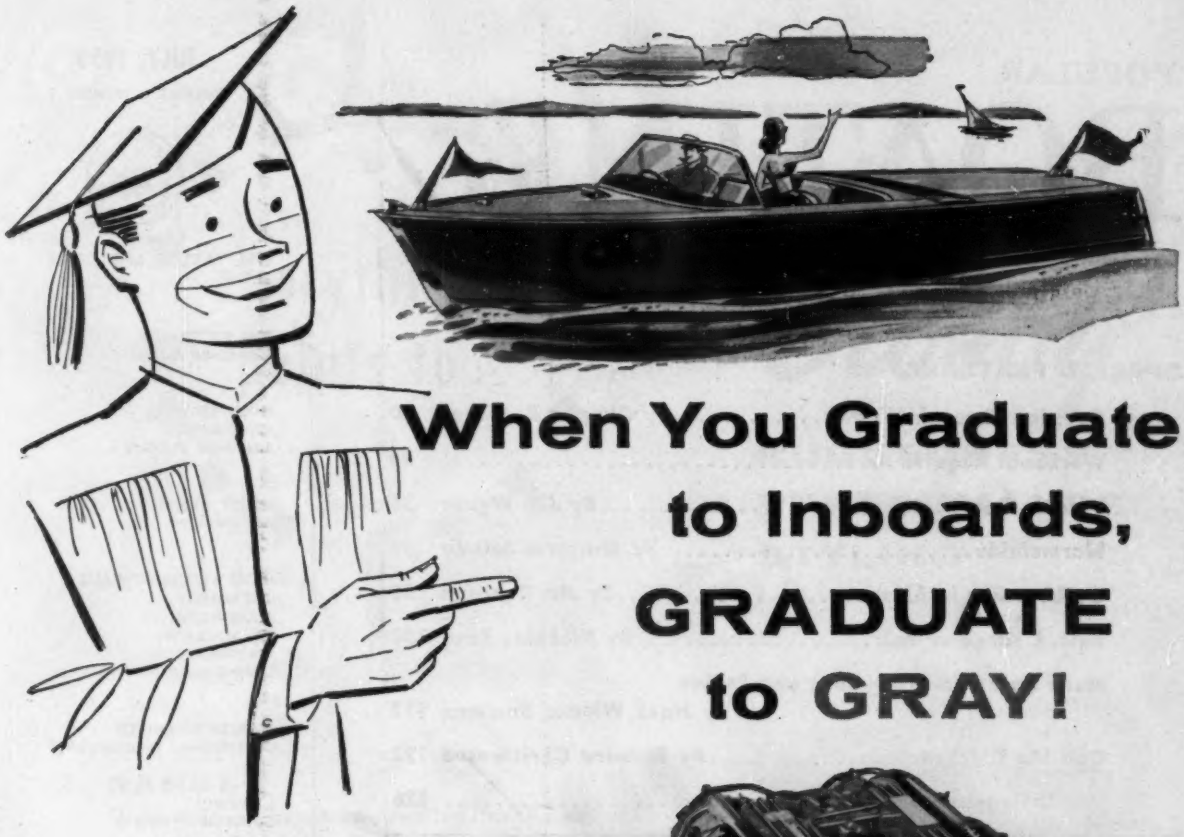
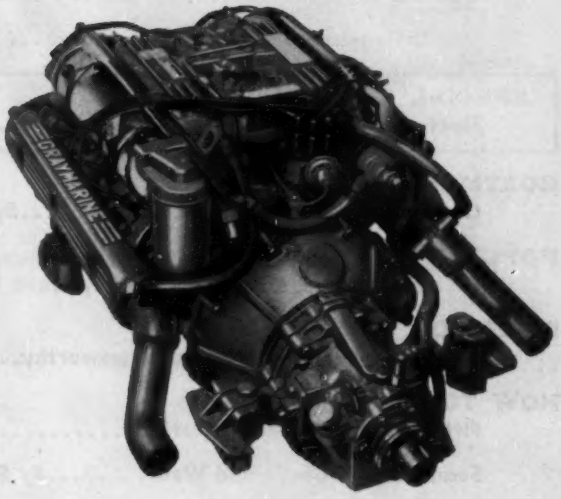


When You Graduate to Inboards, GRADUATE to GRAY!

Inboards cost less to run—less to own, and depreciate far more slowly, hence have higher resale value throughout their life. When you realize every owner's dream and buy your first boat with inboard power, keep one fact in mind: the majority of all stock-boats are powered by Graymarine.



Gray builds the world's finest, most dependable 4- and 6-cylinder marine engines, as well as four great V8's. Shown above is the Fireball V8 225, largest model in the Gray V8 line.

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GRAY MARINE MOTOR COMPANY
710 Canton Avenue, Detroit 7, Michigan

POPULAR
BOATING

THE MAGAZINE FOR BETTER BOATING

JULY, 1959
VOLUME 6, NUMBER 1

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Barbara Sittinger used Kodak Bantam camera, Kodachrome film for cover shot of Marblehead Harbor, Mass., during Race Week

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Ziff-Davis Publishing Company Editorial and Executive Offices
One Park Avenue, New York 16
Branch Offices: 434 S. Wabash Ave., Chicago 5, Ill.
James R. Pierce
Western Advertising Manager
Room 412, 215 West 7th Street, Los Angeles 14, California
2324 Guardian Building, Detroit 26, Michigan

Foreign Advertising Representatives
D. A. Goodall Ltd., London
Albert Milhado & Co., Ltd.
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ZIFF-DAVIS PUBLISHING CO., One Park Avenue, New York 16, N. Y. William B. Ziff, Chairman of the Board (1946-1953); William Ziff, President; W. Bradford Briggs, Executive Vice President; Michael Michaelson, Vice President and Circulation Director; Hershel B. Sarbin, Secretary; Howard Stoughton, Jr., Treasurer; Albert Gruen, Art Director.

SUBSCRIPTION SERVICE: Forms 3579 and all subscription correspondence should be addressed to Circulation Department, 434 South Wabash Avenue, Chicago 5, Illinois. Please allow at least four weeks for change of address. Include your old address as well as new—enclosing if possible an address label from a recent issue.

CONTRIBUTIONS: Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions should be mailed to the New York Editorial Office and must be accompanied by return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's and contestant's rights, in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.
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POPULAR BOATING is published monthly by the Ziff-Davis Publishing Company, William B. Ziff, Chairman of the Board (1946-1953), at 434 South Wabash Avenue, Chicago 5, Illinois. Second class postage paid at Chicago, Ill. POPULAR BOATING subscription rates: U.S. and Canada—1 year $4; 2 years $7, 3 years $10. Pan American countries add 50c per year. All other foreign subscriptions add $1 per year. Single copy 50c.

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PERFORMANCE
STYLING

RANGER
High, wide and handsome describes this 18-foot eye-catcher. Big and husky for use on large waters — versatile for use in fishing, for family fun, as a speedy runabout.

FISH-n-SKI
This winner and record holder of the Mississippi River Marathon offers flashing speed and performance, rugged durability and multi-use design. Here in 16' 7" is outboarding in any way you like it.

CAPRI
16 feet of sparkling performance combined with the ultimate in beauty, styling and comfort. Here is truly the boat you can own with pride.

HURRICANE
This economical 14-foot runabout is designed to please all the family. And, of course, Crosby's rugged stamina and famous performance are found in this boat, too.

RANGER

FISH-n-SKI

CAPRI

HURRICANE

See these and other minimum maintenance Crosby fiberglass beauties at your nearest dealer.

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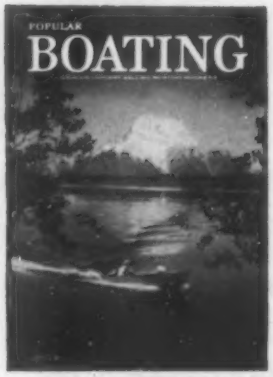
GRABILL, INDIANA

NEXT MONTH



FAMILY CRUISING ISSUE

Safety-Firsts for children, equipment needed for camping-cruising trips, tips for galley efficiency, and weather forecasting for the boatmen will all be featured in this special section.

SPINNAKER HANDLING

Techniques for handling the big kites developed by America's Cup contender crews is discussed by expert sailor-writer Carleton Mitchell in a reprint from his new book, "Summer of the Twelves."

BOATMAN OF THE MONTH

Bill Cox, one of the nation's top skippers in Lightning and other small boat classes, developed the remarkable new 17-foot Tiger Cat catamaran that has proved to be in a class by itself.

PLUS: ALL REGULAR FEATURES, DEPARTMENTS, AND COLUMNS

Microfilm Announcement
POPULAR BOATING has been chosen as one of the national magazines to be permanently recorded on microfilm by University Microfilms, 313 N. First Street, Ann Arbor, Michigan. Further information on this service may be obtained directly from them at the above address.

FROM THE EDITOR—

BOATING SAFETY

The week of June 27th through July 5th has been chosen as a time to remind all boatmen that all the time on the water safe boating practices must be observed for the good of all concerned. This Safe Boating Week is eight days long in order to encompass two busy boating weekends, and the wise boatman will extend it to include every day he is out in his boat.

So that equipment will not be at fault, the U. S. Coast Guard Auxiliary has set up their admirable Courtesy Examination. Boats are rated on the form shown

TREASURY DEPARTMENT
U. S. COAST GUARD
CG-2901 (Rev. 11-54)

COAST GUARD AUXILIARY COURTESY MOTORBOAT EXAMINATION

FOR (Year)

SECTION I - VESSEL AND OWNERSHIP DATA

1. NAME OF VESSEL	2. OWNER			
3. VESSEL TYPE	4. CLASS	5. LENGTH	6. YEAR BUILT	7. CERTIFICATE OR DOCUMENT NO.

SECTION II - LEGAL REQUIREMENTS

YES	NO	ITEM	YES	NO	ITEM
		1. PAPERS ARE IN ORDER			11. WHISTLE IS ADEQUATE
		2. NUMBERS ARE DISTINCTLY VISIBLE			12. BELL IS ADEQUATE
		3. NUMBERS ARE PROPER SIZE			13. CARBURETOR FLAME ARRESTORS ARE REQUIRED BY LAW FOR THIS VESSEL
		4. WHITE LIGHTS OPERATING AND ARE SATISFACTORY			14. CARBURETOR FLAME ARRESTORS OF APPROVED TYPE
		5. COLORED LIGHTS OPERATING, ARE CORRECT COLOR, AND ARE SATISFACTORY			15. VENTILATION FOR THIS VESSEL REQUIRED BY LAW
		6. LIGHTS ARE VISIBLE THROUGH PROPER POINTS			16. VENTILATION FOR THIS VESSEL IS ADEQUATE
		7. LIFE-SAVING DEVICES ARE OF APPROVED TYPE			17. FIRE EXTINGUISHERS ARE OF APPROVED TYPE
		8. LIFE-SAVING DEVICES ARE IN SATISFACTORY CONDITION			18. FIRE EXTINGUISHERS ARE OF ADEQUATE SIZE
		9. LIFE-SAVING DEVICES ARE SUFFICIENT IN NUMBER			19. FIRE EXTINGUISHERS ARE ACCESSIBLE
		10. LIFE-SAVING DEVICES ARE EASILY ACCESSIBLE			20. FIRE EXTINGUISHERS ARE IN SATISFACTORY CONDITION

SECTION III - ADDITIONAL REQUIREMENTS FOR AWARD OF AUXILIARY DECALCOMANIA

YES	NO	ITEM	YES	NO	ITEM
		1. GALLEY STOVE IS OF RECOMMENDED TYPE			6. CARBURETOR DRIP PAN REQUIRED FOR TYPE OF CARBURETOR INSTALLED
		2. GALLEY STOVE INSTALLED AS RECOMMENDED			7. CARBURETOR DRIP PAN INSTALLATION SATISFACTORY
		3. FUEL TANK FILLER PIPE IS TIGHT TO DECK PLATE			8. BILGES CLEAN AND FREE FROM OIL AND GREASE
		4. FUEL TANK FILLER PIPE IS OUTSIDE OF COAMING, OR WITHIN SELF-BAILING COCKPIT			9. ELECTRICAL INSTALLATION IS SATISFACTORY
		5. FUEL TANK VENTS INSTALLED LEADING OUTBOARD			10. GENERAL VESSEL CONDITION IS SATISFACTORY

SECTION IV - ADDITIONAL REQUIREMENTS FOR CLASS A MOTORBOATS

YES	NO	ITEM	YES	NO	ITEM
		1. DISTRESS FLARE			3. SUITABLE ANCHOR AND LINE
		2. PADDLE OR OAR			4. PUMP OR BAILER

SECTION V - CERTIFICATION

I CERTIFY THAT I HAVE PERSONALLY EXAMINED THIS VESSEL AND FIND ITS CONDITION AS STATED IN THE ABOVE REPORT

APPROVED	FLOTILLA NO.	DIVISION NO.	LOCATION
NOT APPROVED			

REMARKS (Use for qualifying any deficiencies noted above and/or reasons for not awarding decalcomania)

DATE	DECALCOMANIA NO. ISSUED	SIGNATURE OF COAST GUARD AUXILIARY EXAMINER

NOTE TO BOAT OWNER: This is one of the services rendered to the boating fraternity by the Coast guard through the Coast Guard Auxiliary. This examination is unofficial, is made as a courtesy, and is made ONLY UPON REQUEST. No copies of this form are retained by the Auxiliary Examiner or by the Coast Guard. This copy is furnished for your information and guidance. Information about the Coast Guard Auxiliary may be obtained from the Auxiliary Examiner.

TO THE MOTORBOAT OWNER: The following check-off lists are furnished to aid you in fitting out your boat with important items not required by law or by this Courtesy Examination but essential and desirable for your own safety, convenience and peace of mind.

ADDITIONAL BOAT EQUIPMENT—CONSIDERED ESSENTIAL

- Anchors (one light, one heavy)
- Anchor chain or lines (ample in length)
- Bilge pumps
- Boat hook
- Compass
- Course protractor or parallel rules
- Deviation table
- Distress Signals:
  - Flares
  - Smoke signals
  - Water dye markers
- Signalling mirror
- Flashlight
- Dividers
- Emergency rations
- Emergency drinking water
- First-aid kit and manual
- Light List
- Lead line (for taking soundings)
- Local Coast and Geodetic charts
- Mooring lines
- Motor oil and grease, extra supply of
- Ring buoys
- R.P.M. table
- Spare Parts:
  - Condenser
  - Coil
  - Spark plugs
  - Distributor head
  - Distributor rotor
  - Distributor points
  - Fuel pump repair kit
  - Fuses
  - Light bulbs
- Tools

ADDITIONAL BOAT EQUIPMENT—CONSIDERED DESIRABLE

- Barometer
- Binoculars
- Canvas bucket
- Chamois
- Coast Pilot
- Deck swab
- Radio direction finder
- Fenders
- Heaving line
- Hydrometer
- Insect repellent
- Kerosene lantern
- Megaphone
- Motor crank handle
- Nails, screws, bolts, cotterpins, washers, wire, tape
- Patent log
- Pelorus
- Radio telephone
- Searchlight
- Spare batteries
- Spare propellor
- Sun glasses
- Sunburn lotion
- Sunburn preventive
- Water pump

NOW THAT YOU KNOW THAT YOUR BOAT IS SAFE, OBSERVE THE PRINCIPLES OF SAFE OPERATION. ASK THE AUXILIARY EXAMINER ABOUT THE COAST GUARD AUXILIARY 8-LESSON COURSE IN BOATING SAFETY.

here, and if your craft meets all required and recommended factors, you are awarded a decal for your windshield. If, however, your boat fails to pass, there is no penalty involved, and you may correct the trouble and try again. Check your boat against the form above, and the equipment listed below which appears on the back of the form. Then contact your local Coast Guard Auxiliary for the examination.

Safe Boating Week is an excellent time to reexamine your boat, your seamanship proficiency, and your resolve to make this a safe year on the water.

—WM. TAYLOR MCKEOWN

SUDBURY Marine Products that Make Boating More Fun, Less Work for the Entire Family!

Ends All Scrubbing and Scraping— Prevents Fire or Explosion

More Sudbury Automatic Bilge Cleaner is sold every year than any other similar product. Every Boat Owner wants the truly automatic cleaner that guarantees a clean, safe bilge automatically. Stop scrubbing and scraping! Get all grease and scum. Just pour into bilge. The roll of the boat does the work. About once a week use 10c worth to each 30 ft. of length...reaches where nothing else can. Deodorizes all bilge odors, even diesel fumes. Prevents fire and explosion by mixing floating gas, oil with water. All goes out when you pump the bilge. Non-caustic, harmless to paint, caulking, fittings, hands. Saves time, money, hard work!

Pt. $1.29; Qt. $1.98.

Let the ROLL OF THE BOAT Clean the Bilge!

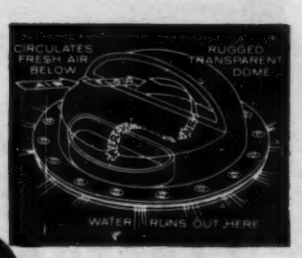
Salt or Fresh Water BOAT-ZOAP

Sudbury's Boat-Zoap is an amazing product for all cleaning jobs, using salt or fresh water, hard or soft. For dishes, china, linens, woodwork, pots and pans—even greasy engines. Removes gull droppings like magic, harbor scum off hull. Cleans everything topside and below. **8 oz. bottle 79c; Pt. Can $1.29; Gal. $7.50.**

(U. S. Patent 2,807,811)

One-piece molded transparent hull. Watch marine life, shoals, reefs right thru boat! Ideal for cartop, portage, fishermen, hunters, campers. Easy to lift, stow on deck. Over open hatch, lets light in, keeps rain out. Can be used with an outboard. 8 ft. long. 45 in. beam. Weighs only 44 lbs. Mahogany gunwales, seats. **$199.95** plus shipping, crating.

TRANSPARENT SKY-VENT



(U. S. Patent 2,711,126)

Lets In Air and Light Keeps Out Rain and Spray

There's no ventilation like Sky-Ventilation! Sky-Vent assures you greater cruising comfort all season. Gives ventilation and light below deck, yet keeps out rain and spray. Prevents sweating, condensation, dry rot, and mildew. Circulates fresh air continuously even with hatches closed. In rough weather, in hurricanes, cabin stays fresh and dry. Many Boat Owners order a Sky-Vent for the forward hatch, another to ventilate the galley, and a third to ventilate the head. Non-metallic, non-fouling, no metal to polish, no maintenance. **9 in. $34.95; 12 in. $59.95; 18 in. $89.95.**

Sudbury Quality Products are sold by leading Marine Supply Stores, Boatyards, Marinas. If the items you want are not now on display at your dealer's, you may order direct on coupon below.

Open Switches are Risky Business
VAPOR-PROOF SWITCHES

Prevent explosion from dangerous open switches! Multiple-pole switch gives selective control of one, two or more batteries in starting or recharging while underway. Single-pole for radio, pump, lighting or other circuits. **Multiple-Pole, $17.95; Single-Pole, $7.95.**

Representatives throughout the U. S. and around the world.

SUDBURY LABORATORY, Box 75P, Sudbury, Mass.

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Please send me the items circled below. I enclose $.....

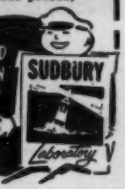
365 BRIGHT-WORK FINISH	**AQUA-CLEAR FEEDER**	**SKY-VENT**
Pt. $3.50 Qt. $6.00 Gal. $23.00	Model A—20 to 74 hp. $39.95	9 in. $34.95 12" $59.95 18" $89.95
365 BRUSH CLEANER ... Pt. $1.50	Model B—75 to 145 hp. $49.95	**SUBMERSIBLE BILGE PUMP**
365 BOTTOM PAINT	Model C—150 to 250 hp. ... $89.95	6v $34.95 12v $36.50 32v $38.75
Quart..$0.95 Gallon..$35.90	**AQUA-CLEAR Crystals** per lb. $2.50	**Automatic BILGE CLEANER**
FIBRE GLASS PRIMER ... Qt. $3.00	**LIQUID AQUA-CLEAR** ... Pint $1.98	Quart...$1.98 Gallon...$7.50
SAFE-T MARINE STOVE $29.95	**TRANSPARENT BOAT** $199.95	**VAPOR-PROOF SWITCHES**
SALT WATER BOAT ZOAP . Pt. $1.29	Plus crating and shipping	Multiple..$17.95 Single..$7.95
		SHOCK-CORD (ask for prices)

Name .....

Street ..... City ..... State .....

☐ Send 1959 catalog describing 365 BRIGHT-WORK FINISH and other Sudbury Marine Products—also AQUA-CLEAR folder.

SEND COUPON TODAY



SUDBURY Laboratory MANUFACTURERS OF QUALITY PRODUCTS FOR OVER A QUARTER CENTURY

SMASH HIT

Above, the Lapstrake Ski Champ, from $510.00
Below, the Lapstrake Seafarer, from $330.00

STARCRAFT ALUMINUM LAPSTRAKE BOATS . . .

Now Starcraft has designed boats that have the performance and strength of lapstrake construction . . . the lightness of aluminum plus the assurance of little, or no maintenance.

The hull has a one-piece bottom—no seams to caulk or leak. Heavy-gauge Starcraft aluminum is guaranteed against punctures and popped rivets for 15 years. See these unusual boats at your Starcraft dealer's soon. Write for color catalog of new Starcraft aluminum and fiberglas boats.

Runabout, completely equipped **$595.00** (plus shipping charges)

Save as much as $200.00 on this new Starcraft runabout, the Jet "15". This low price includes all equipment!

STARCRAFT

STARCRAFT BOAT CO.

Department PB-7, Goshen, Indiana

READERS REPORT:

INSURANCE RATES

I think an unfair insurance rate is charged by companies offering liability or blanket insurance policies on boats in the New England States. Our boating period is roughly five months, from May until October, at the end of which our boats are pulled out of the water and stored for the winter. We do not need Bodily Injury or Property Damage coverage, we do not need collision coverage—all we need for the storage period is fire and theft and yet we pay an insurance rate promulgated for one year's exposure. The people who live in Florida get the same protection for the same money for seven additional months, as compared to the five months of our boating in New England.

On summer hotel properties located in New England, where they are operated on a seasonal basis opening, say, June 15th and closing after Labor Day, the Rating Bureau has approved the writing of public liability coverage on an open and closed season basis, so that during the period when the hotel is shut down and presents nothing more than an existence hazard, the rate is very small. When the hotel is open and doing business during the summer period the owners are paying the going rate for that period. I can see no reason why we cannot get rates promulgated for New England boatmen in this same manner.

In my own particular case, I pay $60 a year for complete coverage on my 16 ft. boat. This rounds out to about $12.00 a month for the five months of the boating period. If I were down South, I could get the same coverage at $60 a year or $5. a month. Therefore, I believe that this readily points out the unfairness of the present program.

R. E. Phillips
Reading, Mass.

BIG BOAT FEATURES

I have a 22' Owens in which I have incorporated many features of a much larger boat. I would like to pass on my ideas to other boatmen. I will try to give you some idea of what I have done although the boat must be seen in order to appreciate some of the features. I have added a hardtop on which I have located the light, mast and horn thereby leaving the cabin top free of all obstructions for good visibility. On the front deck there is a mahogany box where the anchor and dock lines are stored, thereby keeping wet lines out of the cabin. The cockpit floor is covered in linoleum for minimum upkeep. There is a portable ice chest in the cockpit which I use in place of the box in the cabin as anyone who has done any boating knows it is a lot easier to put the ice in a chest and carry the whole box back to the boat instead of carrying a cake of ice and then trying to lower it to the boat without dropping it on the deck or your foot.

The cabin floor is also covered in linoleum as is the sink top. There are two bulkhead cabinets, one by the galley and the other in the head. There is a sink and counter in the head which does not take up any usable space. The water system is electric with a 20 gal. water tank. The cabin and cockpit are wired for 110 volts, using either dock or converter current. The cabin is lighted by fluorescent lights and 12 volt conventional lights. The lined curtains are made of a rot-proof fabric. I use a Sterno stove.

I have done most of the work myself at minimum of cost. The name is the *Poseidon* and the home port is Babylon, L. I., N. Y. It is also equipped with depth indicator, ship to shore radiotelephone and D.F. It is powered by a 96 hp Flagship engine with a 40 gal. stainless gas tank.

The boat has been used by myself extensively on offshore and extended trips.

Theodore De Garmo
Babylon, L. I., N. Y.

NET CASTING

As a regular reader and subscriber of POPULAR BOATING, I have noticed an occasional reference to net casting as an art in fishing. And an art it is, one which is in many ways rewarding. Enclosed is a photo of Ed Hofer, of Palmetto, Florida. This excellent action shot is one in a million, according to local experts, and should help beginners and satisfy the masters.

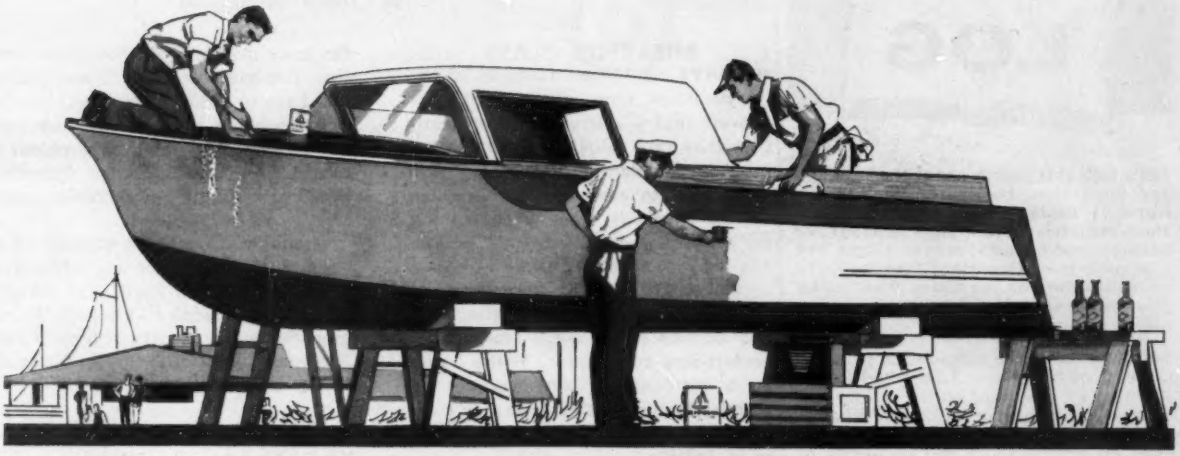
Ed, incidentally, is a boatman "of the first water." He owns and operates the 42 foot *Tru-Lu* on which he is casting for this netful. He has just traded for a 65-footer which he plans to convert for deep sea snapper catches in the Gulf. And for a quick hop to the water "over 'em," he runs a little 12 foot open boat with a 3 hp old outboard. And the writer gets a few with his 18 foot hardtop cruiser.

Enjoy your publication.

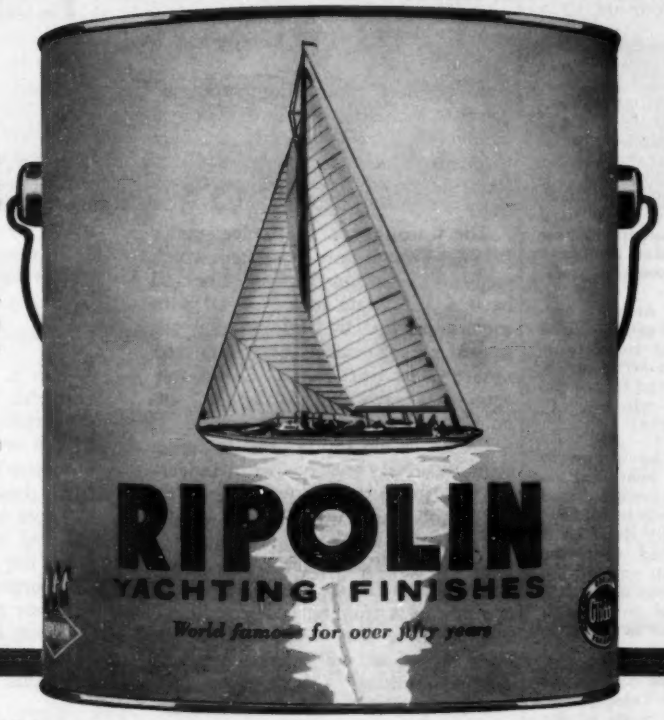
Come see us. They're biting!

William W. Shepherd
Palmetto, Fla.

MORE TIME FOR FUN THE WHOLE SEASON LONG



- Hull, Deck and Topside Enamels in 27 colors, plus Yacht Whites and Blacks.
- Semi-Gloss Interior Cabin Finishes, alkyd fortified. In a wide range of pastel colors.
- Stains, Spar and Rubbed Effect Varnishes.



- Bottom paints—anti-fouling and hard racing finishes.
- Engine Enamels and Primers.
- Fine marine brushes.

Manufactured by The Glidden Company under exclusive license from Le Ripolin.

RIPOLIN...SUPERB LINE OF MARINE FINISHES

Painting your boat is a *real* labor of love—when you are sure the finish will stand up all season long. Some folks even wear their yachting caps at a jauntier angle when their boat is sporting a fine, sleek Ripolin finish.

There's a Ripolin product for every use—from high-gloss topside enamels and superb stains to dependable, protective engine enamels. Start with the best—fine, full-bodied Ripolin products proved over half a century in Europe. Now made by Glidden in the United States under exclusive license, and available from Glidden paint dealers or your marine supplier.

Dealers write for franchise information

THE GLIDDEN COMPANY
CLEVELAND 14, OHIO
In Canada: The Glidden Company, Ltd., Toronto, Ontario
Ripolin Marine Finishes also sold by dealers for MOUND CITY, GENERAL PAINTS

QUALITY Glidden PRODUCTS

Let's talk this month about the largest—and most abused—"party line" in the world. I mean inter-ship and ship-to-shore radiotelephones. They're handy for business and personal conversations, but a phone's most important function is to increase safety on the water. That's why you have a duty when you have a radiotelephone aboard.

Safety requires the cooperation of every radiotelephone owner. Learn and follow the rules for operating on the calling and distress frequency of 2182 kc. What it means for you, is that if you should need assistance, there will be plenty of stations ready to come to your aid.

Fred E. Lawton

Be sure to monitor 2182 kc. when you are underway. Also, learn the meaning and use of: MAYDAY (distress call); PAN (urgent call); and SECURITY (safety call). Know how to reply to a distress call and how to assist in every way possible.

For general 'phone calling as well, certain rules have been decided upon—Part 8 of the F.C.C. rules. These regulations must be posted on vessels with radiotelephones. Be considerate and follow the rules of this "party line"—where every 'phone owner has equal rights.

Safety depends not only on having safety equipment on board your boat, but on how well this equipment is installed and works. In the case of your radiotelephone, good results are particularly dependent on installation. You should therefore have a licensed technician check the ground plate; the connections and leads to ground, the antenna and power supply. Be certain that your set is tuned to the antenna.

Incidentally, an informative booklet on this subject, "Radio Marine Telephony," can be had by sending 60 cents to the Radio Technical Committee for Marine Services, c/o F.C.C., Washington, D.C.

If you would like to have a convenient plasticized card outlining approved radiotelephone procedure to post aboard your boat, please write me and we will send it along without charge.

Fred E. Lawton

Fred E. Lawton, Professional Sailing Master of America's Cup winner COLUMBIA, is a veteran of 30 years at sea. He is a popular speaker on marine safety to boating groups throughout the country.

SAFETY AND EDUCATIONAL AIDS
"SAFETY MAKES A HAPPY SHIP"

"Safety Makes a Happy Ship"

RAYTHEON MFG. CO.
MARINE PRODUCTS DEPT.
WALTHAM 54, MASS.

HERE'S HOW

Answers to Your Boating Queries

By John Kingdon

SNEAKBOX CLASS

"I HAVE an 11-foot duckboat of the sneakbox type which I wish to convert into a sailboat. I have heard that they race small sneakboxes like mine in the Barnegat Bay area, and would like to comply with the rules of this sneakbox class when making my conversion so that my boat will be eligible to compete in these races.

"Can you furnish the class rules and information concerning the size, type and location of the sail, mast, rigging, centerboard and rudder? While I prefer a Marconi rig, this may not be permissible under class rules. If such is the case, a gaff-headed rig would be acceptable."

S. Van Duyne
Ventor, N. J.

All sailboat competition on Barnegat Bay, including sneakbox racing, is conducted by yacht clubs that are members or associate members of the Barnegat Bay Yacht Racing Association.

The sneakboxes that race under BBYRA sanction are 15-footers which measure 13 feet on the water line and have a 5'9" beam and 6" draft with centerboard up. By tradition, they are rigged as gaff-headed cats with 165 square feet of sail. Completely equipped, each weighs about 400 pounds.

Being practically a small racing scow, this boat is very fast in moderate winds and smooth water. In high winds and rough water, however, she is both wet and cranky. Because of these characteristics, she is not a perfect boat for family use, but is much admired as a training boat for junior sailors. It is said, with justification, that "if you can sail a sneakbox, you can sail anything."

I am partial to the sneakbox because I, like thousands of other New Jersey tidewater residents, learned to sail in one and sailed her happily for a number of years in my youth.

Since your boat is but 11 feet long, she is not eligible to compete in the BBYRA sneakbox class. You can therefore rig her in any manner you desire. I suggest, however, that you maintain the cat rig for its simplicity. Whether the sail should be gaff or jib-headed is a debatable point with much to be said pro and con each type.

As for giving you actual dimensions for the sail, spars, rigging, centerboard and rudder, such information is not easily arrived at. It requires the services of a naval architect. He will need far more information about your boat than you have furnished to me, and he will have to spend many hours on the drawing board before coming up with the proper answers. Your problem is thus beyond the scope of POPULAR BOATING's question-and-answer service.

Should you decide to consult a naval architect, the name and address of one close to your home can be obtained from Joseph F. Gregory, Executive Secretary, Society of Small Craft Designers, Inc., Box 628, Newport News, Va.

MATTER OF ETIQUETTE

"I HAVE a 41-foot cruiser and all the necessary pennants and flags to 'dress ship.' Since the mast extends above the cabin only 30 inches, it is impossible to dress ship properly because the cabin top gets in the way.

"Would it be proper etiquette to use my ship-to-shore antenna, running a line from the bow staff to the top of the antenna and then to the stern staff? Of course, this would look a little crooked because the antenna is on the side of the cabin."

H. Brandom Jones
Barre, Vt.

This is, as you indicate, a matter of etiquette, so it is a little out of this department's line; but my opinion is that it would be neither proper nor attractive to use an off-center antenna when dressing ship.

There is a simple alternative. Since a vessel is dressed only when at anchor, the centerline "mast" used for the purpose need be neither permanent nor elaborately stayed. With this in mind, it should be an easy matter to rig a temporary mast on the few occasions when you must dress ship.

V-DRIVE CONVERSION

"I RECENTLY CONVERTED my 19-foot cruiser from twin outboard power to one V-drive inboard that's rated 75 hp at 3,500 rpm. When equipped with two 50-hp outboard motors, the boat's indicated speed was 31 mph.

"As converted, the boat displaces about 3,600 pounds. I expected the speed would go down to 25 mph, which would be acceptable in view of the accompanying fuel economy and increase in reliability. But, driving a 12x10-inch three-blade propeller, as recommended by both engine and boat manufacturers, the inboard turns only

(*continued on page* 12)

COLONIAL

WHEN BLUE HORIZONS BECKON

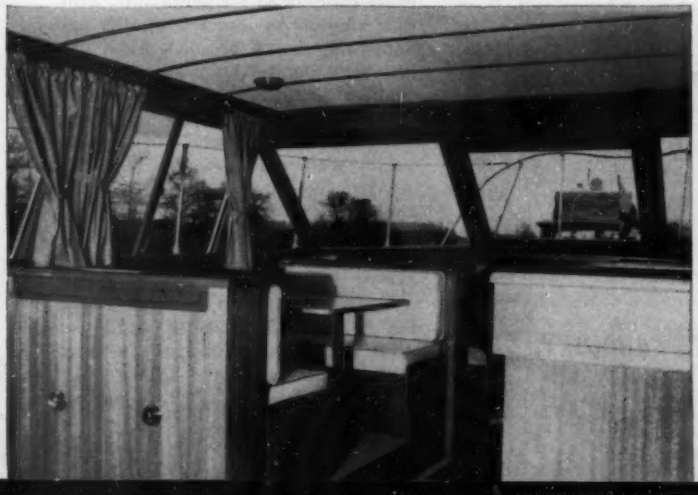
IT'S THE COLONIAL DOUBLE CABIN "40"

No "dockside darling"...no "sweetheart of sheltered waters" is this new seagoing yacht, Flagship of the Colonial Fleet for '59. Rather she is, like all of her sister Colonials, the belle of the blue water; the choice of yachtsmen who answer the call of far horizons. This big, beautiful Colonial has everything the "dockside darling" has to offer plus a yen for the open water. Her exclusive Colonial Roun-Vee hull gives you interior spaciousness and seaworthy performance that put her in a class all her own. The Colonial Double Cabin "40" provides luxury living for as many as eight in three separate areas of her interior. Her picture windowed deckhouse is surrounded by wide walk-around decks with protecting handrails, and the large sundeck is the delight of the followers of Sol. Twin power installations with reduction drives and hydraulic clutch controls are standard. Power options, gasoline or Diesel, range from 170 to 235 HP each. There are other seagoing Colonials from 24 to 53 feet. Ask your reliable Colonial Dealer for more information or write us.

DEALER INQUIRIES INVITED FROM SUCCESSFUL BOAT MERCHANDISERS

COLONIAL BOAT WORKS, INC., MILLVILLE, N. J.

The forward section of the beautiful salon deckhouse contains the dinette, with a complete galley opposite. The companionway leads to the forward cabin.



The spacious master stateroom has builtin chests and hanging lockers, and a private toilet room with optional shower. A second toilet facility is provided forward.

Bartending's a breeze... with Heublein Cocktails aboard! Ready-mixed to perfection. No fixing—just pour on-the-rocks and enjoy. Even the smallest galley can hold a *variety* of Heublein Cocktails. Offer guests a choice.

NEW—BETTER THAN EVER! ALWAYS READY TO SERVE. EXTRA DRY MARTINIS—75 proof, made with pot still gin and finest vatted vermouth. 9 other popular kinds. G. F. HEUBLEIN & BRO., HARTFORD, CONN.

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HEUBLEIN COCKTAILS

CLINKER BUILT

Lyman Famous for Seaworthiness, Beauty and Comfort . . .

THE INBOARDS

18'	Islander	from $2,655
19'	Runabout	from $2,735
23'	Runabout	from $3,695

The name LYMAN is your assurance of lasting beauty, comfort and performance—at a sensible price.

The 19 Footer . . . sleek, trim and fast . . . is wonderfully roomy and "tops" for performance.

The 15 Footer—more popular than ever this year—is available in two models: as an open model . . . and as a stern deck model with self-bailing motor well.

THE OUTBOARDS

13'	Outboard	from $ 460
15'	Outboard	from $ 565
16½'	Outboard	from $ 680
17'	Outboard	from $ 850
18'	Outboard	from $1,210
13'	Leader	from $ 330

The colorful new Lyman folder showing all models and specifications plus the name of your nearest dealer is yours for the asking. Write today.

Lyman BOAT WORKS, 1627 FIRST ST., SANDUSKY, OHIO

HERE'S HOW

(*continued from page* 10)

2,600 rpm and the boat's indicated speed is only 11 mph.

"Is the propeller at fault? If so, what prop do you recommend?"

Clark M. Carr
Albuquerque, N. M.

Your present propeller isn't a bad choice. It does, however, seem to have a little too much diameter. I recommend that you try an 11x10-inch three-blade wheel, or even a 10x10-inch job. If the engine still won't turn up to her rated speed, then the propeller definitely isn't the guilty party, and you must look elsewhere for your trouble.

PROPELLER CHANGE

"I HAVE a 16-foot molded-plywood outboard runabout and a 25-hp Elgin motor. The complete rig weighs about 900 pounds. The hull is designed for speed, but I cannot get over 15 mph. Could you advise me what size propeller I should try?"

Larry D. Carey
Warsaw, Ind.

Your boat should do between 21 and 24 mph with this motor. Try a 10⅜ x 11½-inch three-blade prop.

REFINISHING ALUMINUM

"WHAT STEPS would you suggest for cleaning and repairing the bottom of an aluminum boat?"

Richard Topham
Charlton Heights, W. Va.

If the paint is in good condition, simply touch up any bare, scraped or abraded spots with one or two coats of zinc chromate primer and refinish the entire bottom with two coats of your favorite bottom paint.

If the paint is in poor condition, strip it off with a paint remover and thoroughly clean the surface with a solvent such as International's "Interlux Special Thinner No. 216." To make sure that paint will adhere to this clean metal surface, you should next apply a metal-etching solution such as Pettit's "Alumiprep" or International's "Primewash 353/4," which are specially formulated for aluminum. Thin this solution as directed on the can and, using a stiff brush, work it into the metal pores. After allowing it to etch for the time recommended by the manufacturer, flush it off with fresh water and dry the metal surface thoroughly with a clean cloth.

When the surface is completely dry, apply an anticorrosive barrier of zinc chromate primer (one or two coats if the boat is to be used in fresh water, two or three if it is to be used in salt water). Don't sand between coats. Finish with two coats of small-boat paint, canoe enamel or (for salt-water use) antifouling paint. — JL

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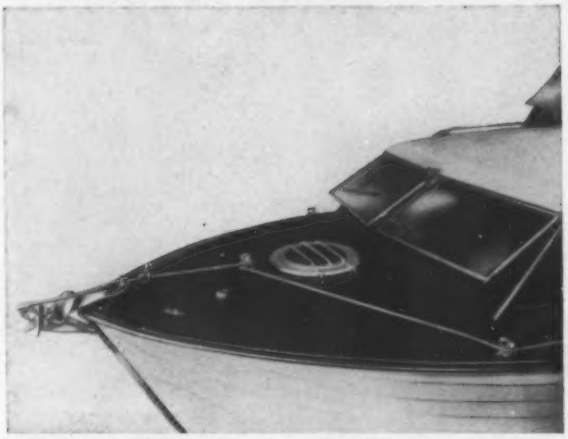
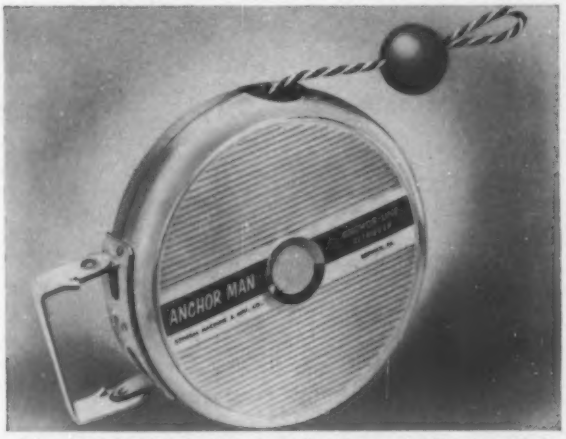
NEW AND NAUTICAL

NEW DESIGNS MAKE ANCHORING EASY

MANY NEW PRODUCTS for the boatman are designed to make boat handling easier and facilitate operation when short-handed. The problem of stowing the anchor out of the way has often, in the past, been solved by "catting" it outside the hull on a short boom or bowsprit. However, until recently, these fittings were expensive and usually custom made. Now several companies are producing devices for both small craft and large, which are readily obtainable, and designed for rugged, corrosion proof service. A representative selection of the range of anchoring aids, both power and manually operated, is shown on this page. Additional information may be obtained from the makers. (*continued on page* 16)



Electric Capstan for 12 volts, with fairleads for handling anchor from the cockpit, retrieves line at 45 ft. per sec. The price is $140 from Benson's Anchors, Syracuse, N. Y.



The Anchor Man by General Machine and Mfg. Co., Berwick 22, Pa., is available in two sizes for either 20 or 40 feet of line. For small craft, retrieves and stores line.

Models in 6 and 12 volts are supplied in the windlass made by Powerwinch Corp., Bridgeport, Conn. The Capstan has line pull of 500 lbs. and sells for less than $100.

Anchors from 4 to 50 lbs. can be handled with the automatic windlass by Fred C. Good, 521 W. Glenwood Ave., Phila., Pa. Corrosion resistant boom houses the anchor.

Remote Anchoring for outboards is possible with unit above by Pelican Products, Box 2025, Houston, Texas. Easily installed and available with 13 and 16 lb. anchors.

It will pay you to find out about the

CAPTAINS CLUB

"THE SERVICE CLUB OF THE WATERWAYS"

The automobile clubs bring service and "peace of mind" to motorists on our highways... the CAPTAINS CLUB was organized to bring this same type of service... the same "peace of mind" to boatmen on our waterways.

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Pilot hints plus a full description of every harbor and its facilities in your cruising area.

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Real insurance economy with wide protection is the heart of these special policies.

Emergency repair service
Through the Captains Club franchised marinas and yards in every harbor.

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If you plan a cruise beyond your home waters ... our cruise director will help you plan your trip, without charge.

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The Diners' Club, working with the Captains Club, has extended its credit service to many marinas and boatyards; a Captains Club member has unlimited emergency boat repair credit at these franchised boatyards, as well as credit service at the 19,000 regular Diners' Club restaurants, hotels, motels, night clubs.

Franchise service
In every port you will find franchised Captains Club marinas, boatyards, waterfront hotels, restaurants and other portside facilities pledged to give you quality service at reasonable prices.

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Fifteen of the major oil companies have agreed to extend oil credit cards to Captains Club members.

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Your Captains Club membership card will guarantee your check at authorized service points for food, drugs, liquor, laundry, etc.

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A monthly digest in telegraphic style of practical news and information for boatmen.

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All the information ... all the instructions on use of our services are included in a handsome waterproof book designed to be carried aboard your boat.

ALL THIS FOR AN ANNUAL MEMBERSHIP FEE OF ONLY $20.00

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Guarantee Your use of our service program will save your annual membership fee—otherwise we will refund your $20.00.

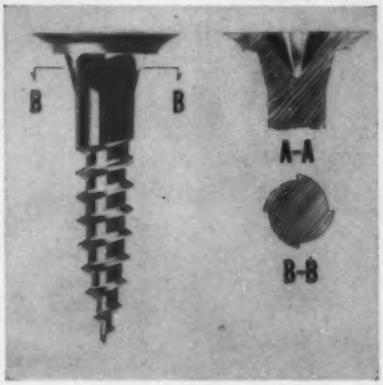
NEW AND NAUTICAL

(*continued from page* 14)

PILOT SEAT

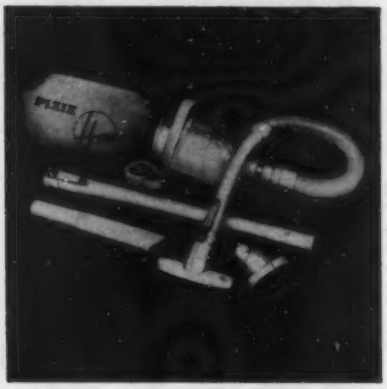
FOR THE HELMSMAN, a new pilot seat which allows relaxed steering, and easy accessibility to controls, is available from Scott-Porta-Fold, 757 Middle St., Archbold, Ohio. The chair can be used in the cabin or on the flying bridge, and is made of heavy corrosion-proof aluminum. The chair screws into a threaded base plate and can be easily demounted. Upholstery is polyfoam, plastic covered, in two tone pastels. Foot and arm rests are optional as accessories.

NEW FASTENER



A NEW FASTENING is the Hobbs head screw, developed for plywood applications. The design differs from a common wood screw in having a flat surface under the head instead of a conical one. This is said to reduce splintering of the laminate due to "wedging" and increase holding power by 60%. Small spurs, marked "B" above, prevent the screws from backing out due to vibration. The new screws are available in silicon bronze from marine dealers.

BOAT VACUUM



A HANDY ITEM for keeping living quarters neat aboard ship is the new portable vacuum cleaner made by the Hoover Company, and sold by Sound Yacht Supply, 72 Danbury Rd., Wilton, Conn. The cleaner weighs only 4 lbs., and is only 18 inches long. It operates on ship's battery current and is available in 12 Volt and 110 volt sizes. The new "Pixie" is sold complete with attachments and is priced at $49.75.

(*continued on page* 144)

Unexcelled...

the world's finest marine radiotelephones are made by Pearce-Simpson

ISLANDER 45

Type accepted by FCC . . . 45 watts input . . . five channels . . . one year warranty . . . optional "channel selecting" remote control available.

Send for free booklet: Marine Radiotelephones — How to Use and Choose Them.

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"My 55-footer goes on extended cruises along the Gulf Coast, and over to the Bahamas," says Gene Mohr of Houston, Texas. "On trips like these you need power you can count on—the kind of economical power you get from Texaco Diesel Chief. And Diesel Chief burns clean . . . helps keep my engines free of deposits.

"Something else I like about Texaco Diesel Chief—it's always *uniform* in quality, never varies from trip to trip. And it's readily available from Texaco Waterfront Dealers along the way. That's why I use Texaco Diesel Chief exclusively . . . and always carry a Texaco Credit Card in my wallet!"

Your Texaco Waterfront Dealer also sells top-octane, anti-gum Texaco Sky Chief Marine gasoline . . . Advanced Custom-Made Havoline Motor Oil and other fine marine products. Get them all at the sign of the Texaco Star . . . along with free Texaco Cruising Charts.

The Texas Company, *Marine Sales Division*, 135 E. 42nd St., New York 17, N. Y.

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Photographed at Beautiful Cypress Gardens

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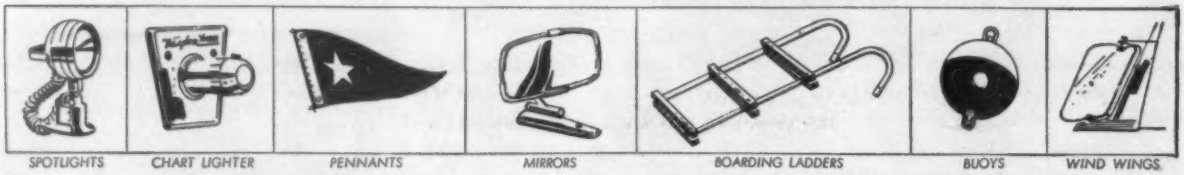
WITH A TAYLOR MADE TOP AND WINDSHIELD

THE NEW HOLIDAY CONVERTIBLE is a dream come true: it comes in sizes to fit almost every open boat! And it's Taylor Made to give more glamour, more comfort, racier lines to *your* boat—make her the snappiest convertible afloat! Only on the Holiday Convertible will you find all these great new Taylor features: Top-Lok fasteners; Plexiglas wrap-around windshield framed in extra heavy aluminum; new white vinyl-covered frames; Speed Aire ventilation; transparent side curtains; zippered storage boot. And Taylor quality costs you less because Taylor is the largest manufacturer of boat tops and windshields in the country! Priced as low as $103.40 complete. See your Taylor Made Dealer right away!

NEW TOP-LOK*—Nylon fasteners snap directly over the windshield frame! No troublesome fastener studs!

NEW SPORT SHIELD—Extra heavy polished aluminum frame, an exclusive with Taylor, gives added strength and glamour to this wrap-around of heavy-gauge Plexiglas.



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Keep in close touch with your home, yacht club— other boats!

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The new low-priced RCA Radio-Phone is just the thing for convenient conversations between your boat and shore, yacht club, cottage, marina, other boats.

Transmitting in the newly-assigned Citizens' Band (27 megacycles), this RCA quality 2-way radio can be used for personal conversations not permitted on other frequencies. And, you'll like its beautiful two-tone blue case.

The Radio-Phone features a powerful 5-watt transmitter with a range of several miles and ability to reach around intervening buildings, trees and to penetrate other signal blocks. Sensitive receiver is designed to hold interference to a minimum. Available for operation from either 6- or 12-volt battery. Both models also operate from standard house current.

See this exciting new RCA 2-way radio at your Radiomarine dealer. Or get additional facts by mailing coupon.

RCA RADIO-PHONE
(CRM-P2A-5)
2-way marine radio for outboard and other pleasure boats

Manufacturer's nationally advertised price... only **$124.95**

RCA RADIO-PHONE shown above is approximately 9" high, 7" wide, 5" deep —weighs only 8 pounds. Comes with combination microphone speaker, detachable telescoping rod antenna, retractable handle.

RCA Radiomarine

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Radiomarine Products, Dept. W-345
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I am very much interested in the new RCA Radio-Phone 2-Way Radio. Please rush all available information.

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ADDRESS_____

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Area where Bear Mountain Bridge crosses the Hudson provides views of unexcelled scenic beauty. Just south of here river is flanked by historic Hudson Peaks.

Hudson River—A Cruise

By Charles R. Meyers

THOUGH IT'S PURELY a matter of personal opinion, smallboat owners who cruise New York waterways frequently claim the Hudson is the world's most beautiful river. She is wide and majestic; sweeping straight—and free from usual clutter of river obstructions—from Albany 112 miles south to the Atlantic, flowing alternately past towering, rugged cliffs and pastoral farmlands; the lower reaches of the Hudson below the state capital aren't really the waters of a true river, but an extended arm of the sea, an estuary. The mean range of tide is about four and a half feet at the Battery, three at West Point, and slightly under five at Albany.

Geologists tell us that a drowned valley was fashioned millions of years ago when the land sank and the sea backed up into the hollow—thus making this so-called river far bigger and wider, disproportionate in size to its tributaries and the drainage basin it serves. As you navigate through the Federal Lock at Troy, skirt the ramps of Sing Sing at Ossining, or gaze up to the span of the Tappan Zee Bridge 134 feet above the water, you can begin to feel the grandeur as well as the changing face of the Hudson. You're cruising the only true *fiord* along the American coast—a perfect place for a seagoing family vacation under sail or power. It's only a few years since commercial sloop skippers, taking the tide on the first of the flood at the Battery, counted on a southerly wind to push them into Albany in 24 hours. On an unfavorable wind from the north, with a poor tide, you'd do better to stay secured to your mooring.

In colonial days, when wampum had more value than a credit card and the word *marina* was still unknown in the English language, the Hudson was a wild river that led explorers into an unknown forest country—today's Hudson River Valley. Sometime in April, 1524, a sea-weary caravel named *Dauphine* lay anchored in "a very pleasant place, situated amongst certain little steepe hilles; from amongst the which hilles there ran down into the sea a great streame of water" or at least that's what her skipper, the Italian sailor, Giovanni de Verrazano, wrote in his log. He was gazing out over the Highlands of Navesink and the hills on the east end of Staten Island; the "great streame" the mouth of the Hudson.

Verrazano was sailing under the French flag at the time. It's interesting to speculate on how the course of history might have been changed if he'd stayed to colonize the area. But he didn't—a sudden storm forced him to sea—and a few wags say Giovanni was the first of an endless number of tourists who have claimed, "New York's a wonderful place to visit but I wouldn't live there if you gave it to me." Nearly a hundred years later, on September 3, 1609, Henry Hudson brought the Dutch East India Company's *Half*

The only true fiord along the American coast, this mighty waterway starts as the barest trickle of a mountain trout stream high in the Adirondacks

An outboard powers past skyscrapers of Manhattan on lower Hudson river. First skipper here from Europe was an Italian sailing under the French flag in 1524.

Ira D. Finke photo

Through History

Moon into an anchorage at Sandy Hook and a dizzy era of trade and colonization began.

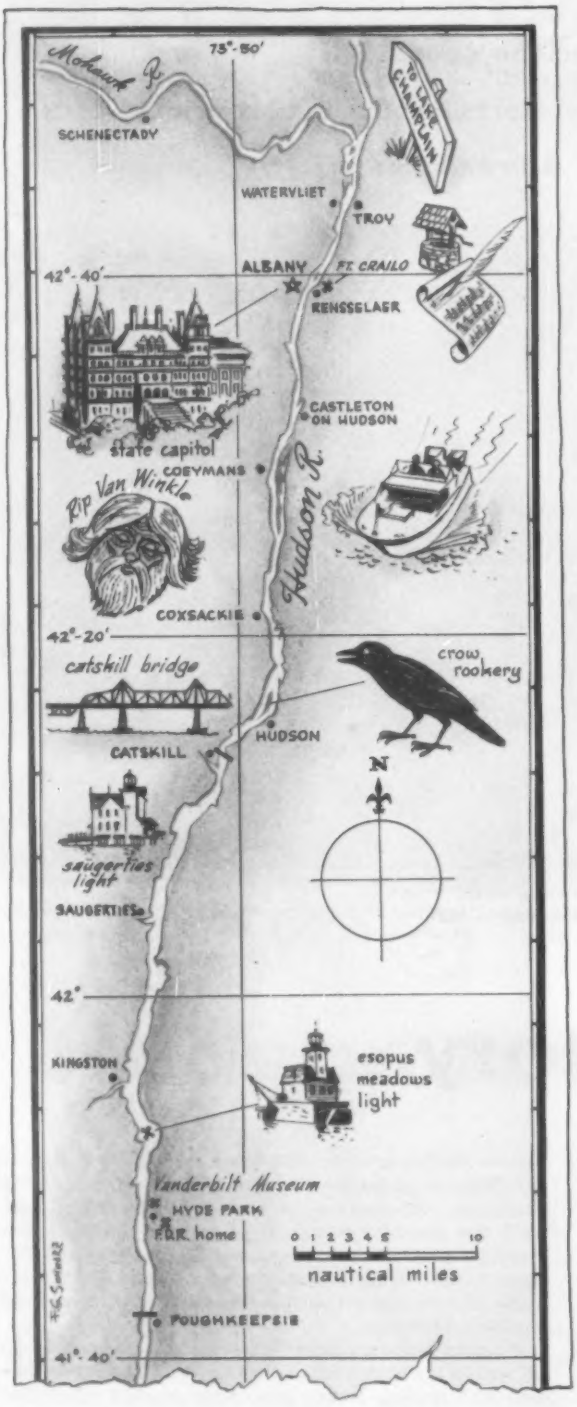
In cruising the Hudson today, you navigate through the Catskills that Washington Irving immortalized in his tales of *Rip Van Winkle, Ichabod Crane,* and the dreaded *Headless Horseman* who "tethered his horse nightly among the graves." Summer squalls swoop down over the broad expanses of the river, making smallboat navigation difficult at times, and the sound of the thunder in the mountains still stirs oldtime residents to tales of ghostly spectres rolling bowling balls in the sky. Maybe there are a great many superficial changes in the area but the boatman's vista seems singularly unspoiled, much the same as it's been through the eyes of the fur traders, Indians in dugout canoes Revolutionary patriots, British soldiers, runaway slaves, iceboatmen, paddle-wheel streamer pilots, shad fishermen and a whole host of others who have sailed the Hudson for business or pleasure.

You'd never guess that this mightly waterway starts as the barest trickle of a mountain trout stream in the wildest portion of the Adirondacks, but the Hudson's initial pond source is Lake Tear of the Clouds, between Mounts Marcy and Skylight, about 4500 feet above sea level. Up in that Forest Preserve country, plunging over a rock ledge or gurgling a serpentine path between an expanding series of pools and lakes, the Hudson gathers its strength like many another American river. She meets the heavily industrialized Mohawk at the town of Cohoes near Troy, and from this point 140 miles to the George Washington Bridge, you'll find magnificent cruising grounds with over 40 good overnight ports along the way, and new marinas and protected harbors being completed every season. The Hudson is less of a transportation hub and more of a recreational waterway each year.

If you're anywhere near Rensselaer, take a look at the old well in the back yard of Fort Crailo. They claim that American musical history was made on that spot when British army surgeon, Dr. Richard Shuckburgh, scribbled down the derisive words to "Yankee-Doodle" as he watched a motely drill by the provincial militia attached to the force about to assault the French at Ticonderoga. That was in 1758. By 1800, the catchy words were known as the marching song of the Revolution, and the sons of those raw recruits proudly sang the verses as they recalled victories over the British with the surrender at Yorktown.

You're drenched in history navigating downriver and, if there's a stiff breeze blowing against the tide, you have a fair chance of feeling considerable spindrift in areas like Catskill where the current may top the two knot marker. There are very few worrisome shoals however, the river markings are frequent and well situated, and the fish traps

HUDSON continued on next page



UPPER HUDSON RIVER

Indians, British Redcoats, runaway

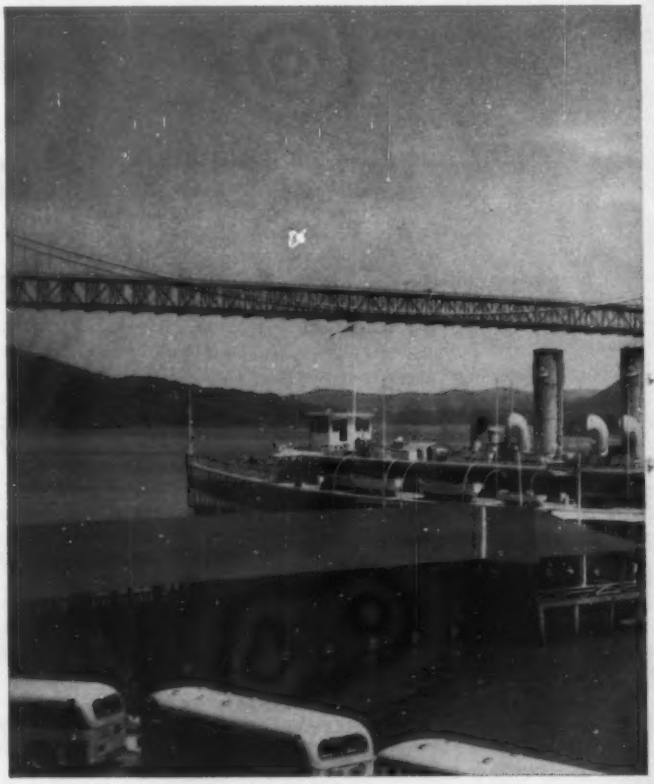
HUDSON continued

extending off the Jersey shore are usually flagged by day or hung with lanterns on their outer perimeter after sunset.

The Johnsburg Fish and Game Club is the prime backer of a White Water Derby that is planned as an annual event along the upper Hudson between North Creek and Riparius. Twenty-five boats—representing 44 entries from eight states and Canada—paddled the eight mile rapids course along the river during the 1958 contest, while approximately three thousand people watched from the banks. There will probably be a far larger gallery this year.

In Troy, at the headpoint of Hudson River navigation, it is interesting to pause long enough to see the "Uncle Sam Tablet" marking the grave of Samuel Wilson in Oakwood Cemetery. Once an army beef contractor in the War of 1812, Wilson is famous as the original "Uncle Sam." There were plenty of boating accommodations in the area anywhere from Watervliet, Cedar Hill, Castleton-on-Hudson, Coeymans and the natural harbor at Coxsackie. At Hudson itself, once known as Claverack Landing, there was once a considerable whaling fleet despite the fact that the community is over a hundred miles from the ocean. In 1797, Hudson missed becoming the capital of New York State by a narrow margin of a single vote. There's no trace of the old whalers today, and the town is no longer one of the leading ports along the river.

The "cat" in Catskills came from the catamount, an animal whose fur helped build such early American fortunes as that of John Jacob Astor. You can see the mountains rising sheer and precipitous, thousands of feet above



Hudson River Day Line steamers, right, from New York City arrive at Bear Mountain daily, and hundreds of visitors troop ashore to visit state park here.

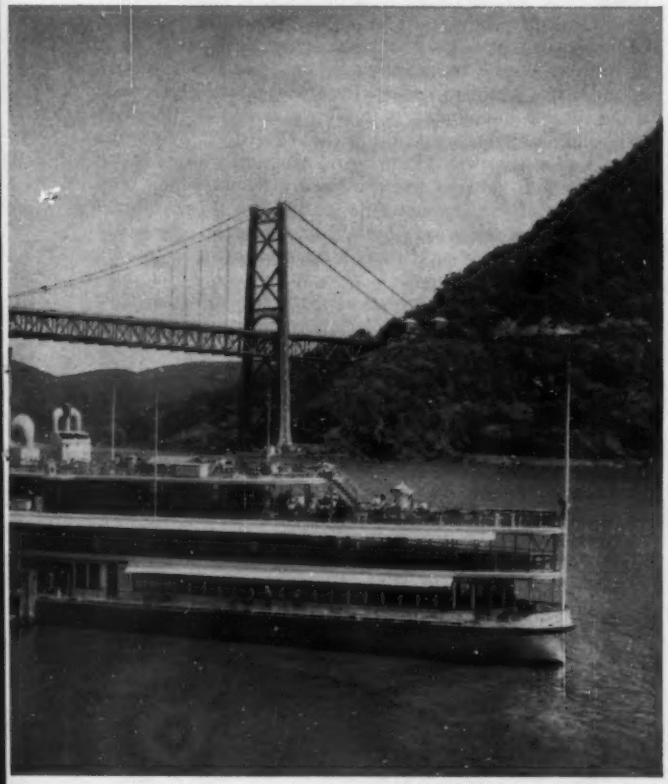
slaves and Fulton's Clermont have gone boating on this river

the river, and it isn't hard to imagine why the early Dutch settlers feared the Indians, wild animals, and ghosts that they believed were constantly prowling those crags. Nowadays, the picturesque backcountry dirt roads that wind into the hills are more likely to billboard your path to a resort hotel than a redskin encampment. The gullies and ravines are commonly known by the old Dutch name of "clove" and the streams are "kills." A lot of the early colonial atmosphere has been preserved by conservation groups but many of the older landmarks have fallen before the determined attack of seasonal vacation populations.

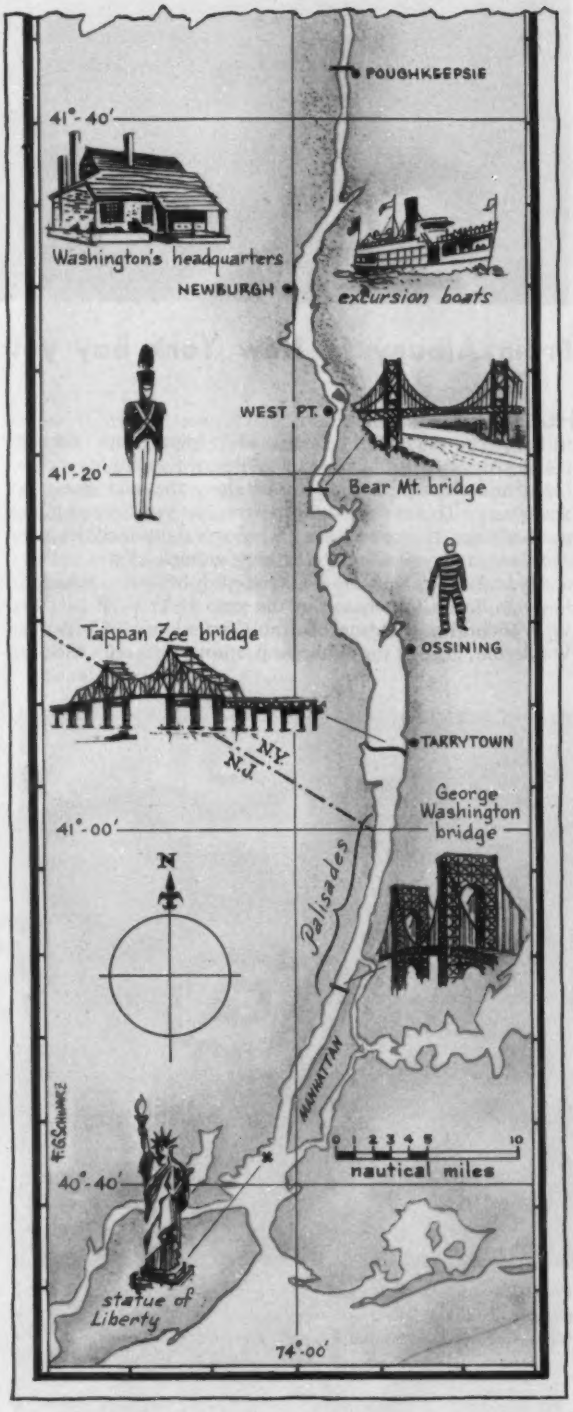
"The sloops which ply the Hudson," wrote N. P. Willis in 1840, "are remarkable for their picturesque beauty, and for the enormous amount of sail they carry in all weathers, and nothing is more beautiful than the little fleets of from six to a dozen, all scudding or tacking together, like so many white birds on the wing." But the completion of the Hudson River Railroad and the use of freight barges towed behind tugs put an end to the commercial era of sailboating. The sloop gave way to Robert Fulton's *Clermont*, steamboats raced the river, boiler explosions were heard around the countryside, and Congress passed the Federal steamboat inspection act in 1852 to cut down the burgeoning accident totals. Today, trim class boats and auxiliaries tug at their yacht club moorings on the same waters where safety barges or "lady boats" which could be cut adrift, in case of accident were once towed behind the regular craft, the passengers aboard them charged a commensurately higher fare.

Below Catskill Creek, Saugerties, the Roundout Creek

HUDSON continued on next page



LOWER HUDSON RIVER



Grace Line's new ship Santa Paula cruises upriver past George Washington Bridge. Palisades along west bank of the river are silhouetted against the evening sky.

From Albany to New York Bay you ride through American history

HUDSON continued

in Kingston—all favorite haunts of "Moonshiners" during the dry days of Prohibition, you'll pass Esopus Meadows Light and come into Indian Kill along the east shore at Staatsburg. This is your entryway into the most spectacular part of your Hudson cruise. The overnight facilities are excellent, and you should stay long enough to pay a visit to Hyde Park. The 211 acre Vanderbilt Mansion National Historic Estate, purchased in the year 1895 by Frederick W. Vanderbilt, grandson of "the Commodore," Cornelius Vanderbilt, is open for public inspection. With its Venetian chairs, Medici tapestries, a 300 year-old Persian rug and Renaissance art masterpiece mantels, the 54 room house and surrounding grounds are almost unbelievably beautiful.

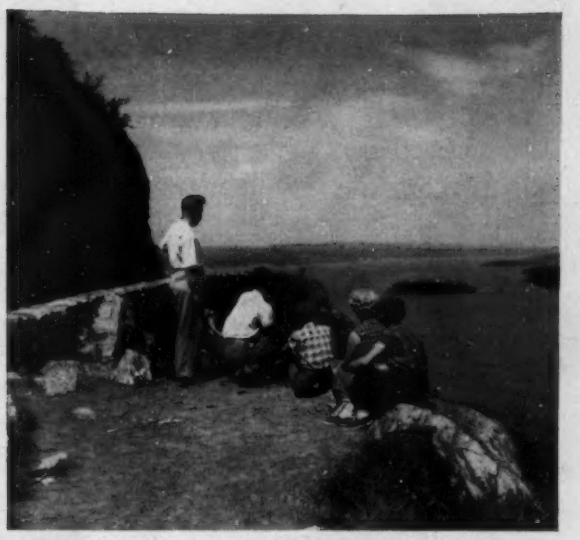
Pleasure boat powers past ocean-going freighter tied up at the Port of Albany, a deep-water port 150 miles up the Hudson River above New York.

Two miles south along Route 9 is the home of President Franklin D. Roosevelt, the shrine turned over to the National Park Service by his wife on the first anniversary of her husband's death, April 12, 1946. The limited capacity of the house makes it advisable for visitors to arrive early in the day during the summer or on weekends to insure admittance. President Roosevelt's grave, marked by a plain white marble monument, is in a rose garden northeast of the building. Adjacent to the National Historic Site is the Franklin D. Roosevelt Library And Museum with its Naval vessels, photo gallery, and the Oddity Room which contains some of the unusual gifts sent to the White House. As many as ten thousand people from all parts of the world enter those grounds on a single day, often waiting in long queues outside the house.

Poughkeepsie is best known as the home of Vassar College or the site of the intercollegiate rowing championships —depending on your age—and Newburgh was once an important whaling port. As you lay anchored at the hospitable Newburgh Yacht Club, located at the foot of a steep hill about a mile north of the ferry landing, local historians may tell you about Captain George Austin who switched from whaling to trading ivory, head his *Colonel Crocket* for Africa, ran aground off the coast, and thus gained the dubious distinction of being the only Newburgh sailor who ended up in a cannibal's stew. The town itself is in an agricultural and resort district on the northern terminus of the Storm King Highway, the approach to Bear Mountain Park. Rising high above the river in a series of terraces, Newburgh is at the northern entryway to the Highlands, where the Hudson breaks through the Appalachian Mountain wall.

The little Jonathan Hasbrouck House, at the southern end of Newburgh on Liberty and Washington streets, was

West Point Military Academy is one of many historic sites that can be visited on Hudson River journey. View here is north from the Victory Monument.

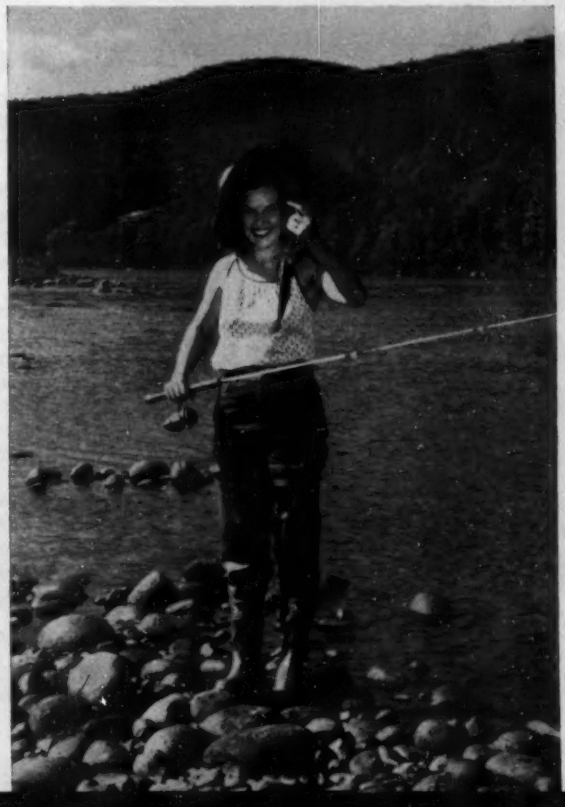


Sailboats on river look like toy craft from Storm King Highway, near West Point. This road was cut into the rock above the west bank of the river.

the headquarters of the Revolutionary Army from April 1, 1782 until August 18, 1783. It was here that George Washington took his famous firm stand against the formation of a monarchy in the Colonies, and it was here he resigned his commission after the fighting forces were disbanded. A little further downriver, you'll pass the city of Beacon, a town that received its name after beacon fires were burnt on the summit of Mount Beacon to warn Washington, at Newburgh, of the movements of British troops up the Hudson. It was here that the Order of the Cincinnati, the first of many American patriotic societies, was organized at General Von Steuben's headquarters in 1783—though nearby New Windsor also lays claim to this historical distinction.

The Hudson plunges into a narrow gorge as it enters the Highlands, winding through a wooded area bordered by these majestic hills. Four miles upriver from Fort Montgomery, which provides an anchorage or launching ramp at the foot of towering Bear Mountain, you can taxi to West Point, site of the famous United States Military Academy, first occupied as an Army post during the Revolution. It opened with only ten cadets back in 1802, but nowadays they number in the thousands. Pershing, Arnold, Eisenhower, Bradley, MacArthur and even Edgar Allen Poe and James A. McNeill Whistler attended classes here. You can still see links of the West Point chain which was stretched across the Hudson to Constitution Island as a defense against the square-rigged British ships. They couldn't make a double turn without altering course and losing attack headway. Though the British attacked Fort Montgomery and hacked through the links of a similar chain by the light of burning American ships, they never did manage to capture or even break this 186 ton, 500-yard length of West Point chain.

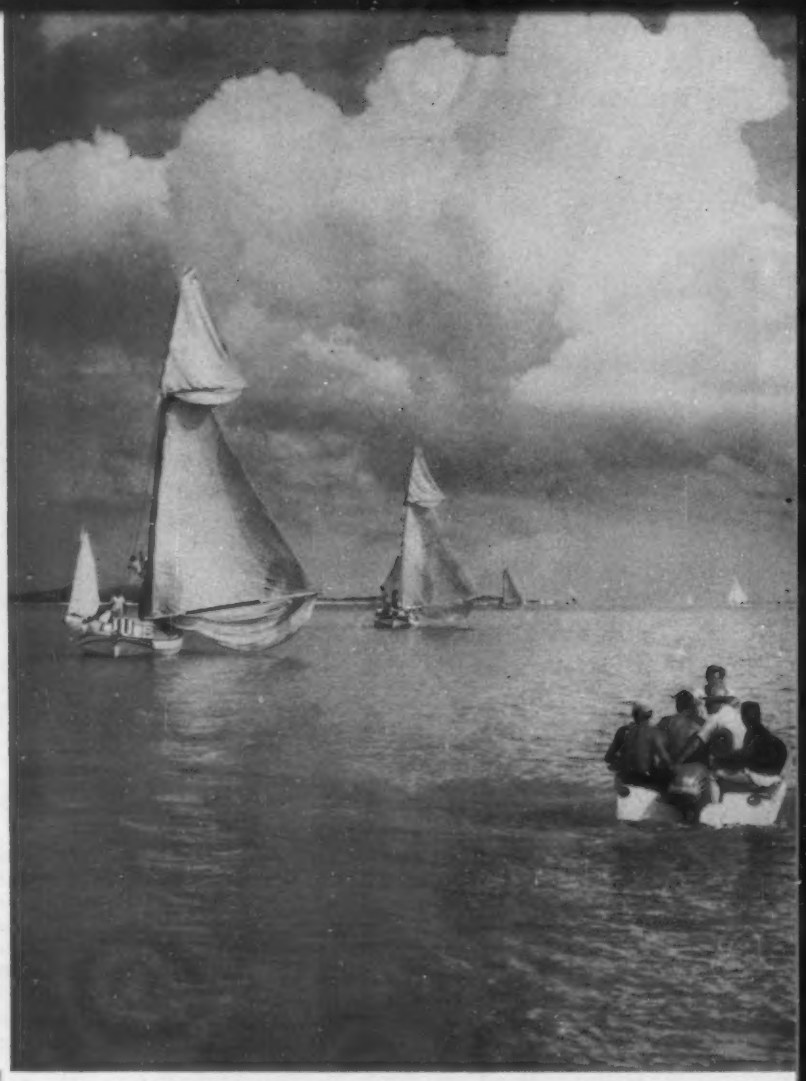
As you sail down past Verplanck and Stony Point—regarding which "Mad" Anthony Wayne once told Washington, "I'll storm hell, sir, if you'll make the plans," and Washington answered, "Better try Stony Point first"—you'll cruise to Haverstraw. "Treason House" is there, where Benedict Arnold and John Andre met in an all-night session to discuss the betrayal of West Point to the British. Stretching south to the George Washington Bridge in what looks like a straight line from the Hudson, are the dark ramparts of the Palisades. They separate the valleys of the Hudson and the Hackensack, which flow parallel for 30 miles, and that last lap of your river cruise past them finally brings you into New York Bay at the lower end of Manhattan Island. You've ridden with history and beauty on a trip you'll be anxious to repeat next season.—



Broad smile testifies to success of this angler who found that fishes were biting in waters of the upper Hudson river near North Creek, New York.

Work Boat Regatta

Probably the world's most colorful race is held every year in the Out Islands of Britain's Bahamas



Trade wind clouds reflect in the clear green waters of George Town harbor as work boats crowd on all sail for the run home to finish line. Competing crews assemble from the many out islands.

GEORGE TOWN, Exuma, Bahamas—Prizes, plus a pennant that signifies the best sailboat in the Bahamas, brought nearly 50 workboats to George Town, here again this year for the sixth annual Out Island Regatta. Founded by J. Linton Rigg, it may be the world's most colorful race.

Held in a sheltered harbor 130 miles south of Nassau, on light green waters that are unbelievably clear, the event attracts visiting yachts from as far north as Chicago and Boston, and this year the Prince Philip, Duke of Edinburgh, stopped off on his round the world tour.

Rules are basic: boats about to collide must both tack, all course marks must be rounded properly, craft are at anchor at the starting gun, and may the best boat win. Crew may be any size; all are professionals who make their living year around under sail. This year a "rule beater" with masthead rig, winches, and hull lines suspiciously like a racing yacht made a try for first place, but once again tradition prevailed as Staniel Cay's Lady Muriel sailed home the winner. — ⚓

Aboard Popular Boating's Miami-Nassau racer, left, Editor McKeown, governor of the Bahamas Sir Raynor Arthur and Lady Arthur, the Prince Philip, driver Jim Wynne, P-B's Skip Allen on forward deck, and the Prince's aides ride out George Town's harbor for a view of the native fleet during the Prince's visit.

Arriving to watch the regatta after a 130 mile run down from New Providence, the Nassau Outboard Club on a cruise sponsored by Esso Marine complete a notable two-day open water voyage.

Professional skippers and crews sail their wind-powered cargo boats in this special event

Will progress come to the picturesque Out Island sailboats? Visitors this year watched with interest to see if racing balloon spinnakers appeared. Nearest approximation, above, were sails borrowed (with mast, boom, and all from sailing dinghies) and "wung out" for added area.

A winner of two previous regattas, Kleerer Naomi, from Nassau, New Providence Island, sends a crewman aloft to set her "Bahama topsail." Loose-footed mainsail, typical of the Out Island workboats, is wet from water splashed on to make it draw better on a day of light airs.

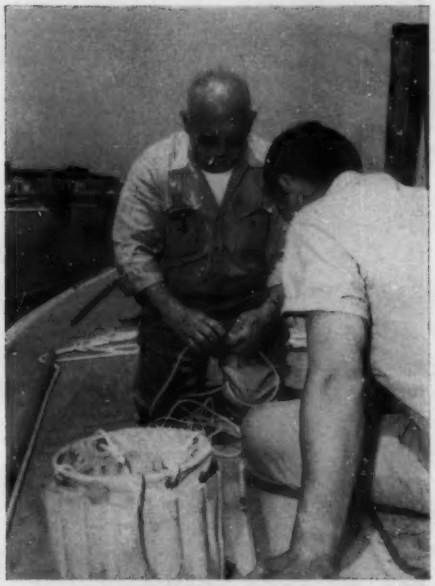
From the patio of Club Peace and Plenty, once a slave market and now attractive resort mecca for cruising visitors, yachtsman Pierre S. duPont, III, looks out over visiting fleet.

Lady Muriel, a 29-footer from Staniel Cay, Exuma, took this year's Class A championship; went home rated Best in Bahamas.

Kay Allen photo

boatman of the month

FRED A. LAWTON



Lawton supervised installation of miles of running rigging on Columbia after checking every construction step.

From fireman on a Fall River Line steamer, Captain Fred has risen to professional skipper on such yachts as Vim, Good News, Bolero, and America's Cup defender Columbia

By A. Newell Garden

A TRIM DARK CABIN CRUISER came alongside *Columbia*. The man in the sport jacket doffed a cap exposing a balding head. "Good luck, Captain," he said.

From the deck of *Columbia* where he was busy directing last minute preparations, Captain Fred A. Lawton, her sailing master, replied, "Thank you, Mr. President, we'll do our best."

And of course they did do their best and the America's Cup is still firmly moored to that polished table in the trophy room in the New York Yacht Club.

There are certainly not many boatmen who can claim personal encouragement from the President of the United States, especially when the President admits that he prefers golf to boating.

Captain Fred is as much at home explaining the fun of boating to a golf-dedicated President as to an enthusiastic junior in a homemade punt. He's been living boating and telling others about it for almost all of his 52 years.

In 1955, Raytheon president Charles Francis Adams, a yachting enthusiast, (*Auk II*) offered Captain Fred a position with the marine products department of the Waltham, Mass., electronics firm. Adams knew Captain Fred's record as an outstanding professional and his ability to share his experiences with other boatmen. As Director of Marine Safety and Educational Aids, Captain Fred became Raytheon's ambassador to the boating fraternity. His assignment: "tell them all you know about boating and help them get the most out of their electronic aids to navigation; sell safety and education."

Helping to share his sea lore with others, Captain Fred is a popular guest speaker at yacht clubs and service club meetings. He's a frequent guest on television programs, too, promoting recreational boating and encouraging safety and education among boatmen. Conservatively, his safe boating program has reached some five million people.

Recently he was asked to speak to a group taking a Power Squadron educational course. The students asked such well-informed questions that Fred enrolled and took the course, too!

Frequently he's asked how he got to be one of the nation's top-seeded professionals. "I guess you'd say that I was born into boating," Captain Fred explains. "I was born and raised in Newport, Rhode Island, and spent my summer vacations from school trap fishing. When I was graduated from high school I went fishing full time. Then, at the encouragement of my uncle who was chief engineer in an Army tug in Newport, I joined the Fall River Line as a fireman and spare oiler."

This was an educational job and Fred soon transferred to the freight boat *New Haven* plying between New York and New Bedford. "As a fireman," he says, "I must have shovelled enough coal in six months to heat a house for a lifetime but I did get a good exposure to the machinery side of a ship and how to keep it running."

Once more Fred tried the shoreside life. This time as a clerk in a New York bank. Whenever he heard the bank's executives talking about their yachts he longed for the sea again. He reasoned that it would be many years before he

BOATMAN continued on next page

Fred Lawton at the helm of Bolero in the 1952 race from Newport, R. I. to Bermuda: in his four Bermuda races on Bolero, she took three firsts, and a second.

Long hours of crew training paid off when Columbia was selected to defend America's Cup. Lawton and Rod Stephens drilled sail handlers. Shown are Lawton, left, Wallace Tobin, Olin Stephens, Briggs Cunningham and Henry Sears.

Sailing on Columbia capped Lawton's colorful career

BOATMAN continued

could work his way up in the bank, but that he could probably work his way up faster on board a yacht where he already had some aptitude and nautical training.

Captain Fred's first yachting job was in the *Aloha*. She was a 215-foot bark owned by the late Arthur Curtis James. *Aloha* carried a crew of 39 under Captain Otto Zornow, who had spent many years in sailing ships in Germany.

"Zornow was one of the finest seamen I've ever met," reminisces Fred. "It was in *Aloha* that I really learned marlinspike seamanship and sail handling. It was very much like being in a private little Navy. We had instruction periods, watch billets, emergency drills, and liberty lists."

In his six years on board Captain Fred rose from deck apprentice to second mate. During this tour he sailed *Aloha* on two trips to Europe, one of these to Scandinavia and the other to the Mediterranean, two cruises to Florida and several coastal cruises to Canada. Like the other grand yachts of the middle twenties, her cruises were extended ones with seldom more than a half-dozen guests and often without even the owner on board.

It was in *Aloha*, with her 20 sails of fine Egyptian cotton set and her stuns'ls drawing, that Captain Fred logged his fastest speed under sail. "We were homeward bound from a summer in Europe," Fred recalls, "and she really stepped out with a 'bone in her teeth.' I thought the flywheel on the taffrail log would spin off as she logged a steady 17 knots for hour after hour."

In 1931 Captain Fred joined *Argosy* as second mate. She was in the Mediterranean cruising for her owner, Charles A. Stone, of Stone and Webster. A 265-foot yacht with a clipper bow like Morgan's famed *Corsair*, *Argosy* was sailed by a crew of 29.

A year later Fred was advanced to the Chief Mate's billet. In 1933, *Argosy*, while still in the "Med," was chartered to Harold Vanderbilt and party for a season of cruising. This was to be a real turning point in Fred's career.

During the cruise *Argosy's* master suffered a serious illness and was confined to his cabin. Fred filled the skipper's position with the experience and tact that were expected.

When the Vanderbilt charter came to an end, *Argosy* was sold to Sir Thomas Sopworth who was then building *Endeavor I*. *Argosy* was to be the tender for the British challenger to the America's Cup. Stone's crew was paid off in Europe and the Americans returned home with some of the personal belongings that were not included in the sale to Sopworth. Arriving in New York Fred found a note waiting for him. Harold Vanderbilt would like to see him at his earliest convenience.

In an interesting twist, the America's Cup Races that had cost Fred his berth in *Argosy* provided him with a new stateside berth as master of *Vara*. Captain Fred sailed the Vanderbilt flagship with a crew of 16. A twin-engined diesel yacht, *Vara* served as tender for the colorful *Rainbow* in the 1934 Cup Races, and for *Ranger* in 1937.

By 1939, *Vara* was temporarily retired in favor of the smaller *Vim*. Fred was assigned to the shipyard where she was abuilding. He studied the Olin Stephens plans in the finest detail and watched every operation in the shipyard to insure that the new 12-metre would be just as Stephens had designed it and just as Vanderbilt had ordered it. After fitting-out *Vim*, Fred went to England with her—this time his charge was deck cargo on board a freighter.

Vanderbilt had sent his new *Vim* to accept Sopworth's challenge to race in England. She was pitted against Sopworth's own *Tomahawk* and such others as *Evaine*, *Flicka*, and *Jennetta*. Built to be a champion, *Vim* left the British squadron in her wake.

Fred brought *Vim* back to America and activated *Vara* from her retirement to become an auxiliary vessel for the Navy.

Vanderbilt had then ordered the 117-foot motor sailer *Vagrant*, at Bath Iron Works. Fred was asked to supervise

BOATMAN continued on page 32

"MFG" covers the waterfront

with EIGHT lapstrake beauties

. . . a size and model for every use
. . . a price for every budget

When we introduced the first mass-produced fiber glass plastic boat in late 1955, only one size was made, because the tremendous investment in equipment and dies ($250,000) required larger unit sales volume in one size than any fiber glass plastic boat maker had ever made in one year in all sizes. This boat has outsold all other 15-foot boats. (Heated metal dies produce far higher strengths at lower cost . . . you get *more* in "MFG".)

In late 1957 we built a second set of dies to produce our 13′ Corry models, which immediately became the largest selling 13-foot boats.

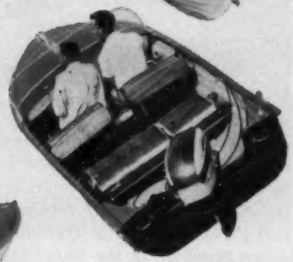
In early 1959 we brought out an all-fiber glass 17-foot line of boats, smooth, speedy, seaworthy, and exceptionally rugged, which are now being delivered to your dealer in large volume, and we followed this in March with an all-fiber glass 15-foot boat to go along with our 15-foot wood-trimmed fiber glass-hulled boats.

It takes confidence and previous sales success to invest in expensive dies and equipment ($500,000 additional since 1956) to give the American boating public a complete line of "MFG" Boats, which you see pictured here.

They are the best fiber glass plastic boats built, and "MFG" production methods make them the lowest priced. See them at your "MFG" dealer . . . for his name, drop a card to:

15-foot Celoron
$575

15-foot Union
$525

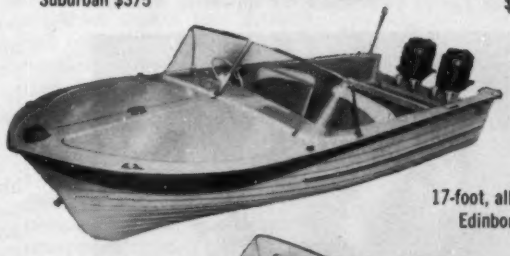


15-foot Cambridge
$555

15-foot Erie
$595

13-foot Corry Utility
$325

13-foot Corry
Suburban $375



17-foot, all-fiberglass
Edinboro $995

15-foot, all-fiberglass
Oxford $625

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One of the MOLDED FIBER GLASS COMPANIES, world's largest producers of fiber glass reinforced plastic.

Lawton has mastered the many skills of a true "ship's husband"

Lawton goes over Columbia's plans with project engineer Paul Coble, left, and Nevins workman. His task was to check every piece of material, every construction detail to make certain exact specifications were followed.

BOATMAN continued

her constuction and fitting out. Launched just before Pearl Harbor, *Vagrant* was painted Navy grey just one month later.

Captain Fred Lawton, master's license in hand, joined the Navy, too. Lieutenant Lawton was attached to the operations office at the section base in New London initially, and then was given command of the subchasers PC-624 and PC-594. After a tour afloat as supervisor of the shakedown program in the Subchaser Training School in Miami, Captain Fred was a real captain again. He sailed the destroyer escort *Dionne* (DE-261) out to the Pacific and the "big show" in the Marshalls, Tarawa, and Makin.

Recalled to Hingham, Mass., Fred was to be the first commanding officer of the destroyer escort *Daniel A. Joy* (DE-585). The *Joy* saw action in the Mediterranean and then at Leyte, Lingayen, and Okinawa.

Back under sail again in 1946, Fred skippered the 64-foot yawl *Good News* for Mrs. Samuel Peck. He raced the yawl in the Bermuda race that year and sailed her in cruising assignments along the New England coast and in Chesapeake Bay. The following year saw Fred in *Skylark* for the same owner.

Fred's reputation for seeing that the best ones are built right won him a commission from John Nicholas Brown, prominent Rhode Island yachtsman, to supervise *Bolero's* building and become her master. The 73-foot yawl would carry a four-man professional crew.

Lawton watches as a workman uses adze to fair a frame into keel timber during Columbia construction. This assignment was a repeat of job he did for Harold S. Vanderbilt during building of Vim, back in 1939.

In four Bermuda races *Bolero* took three firsts and a second. "It was during the 1950 race that I had my most anxious moment at sea," Fred recalls. "Crewman Archie Sandermeer was working amidships cranking a coffee-grinder (Genoa winch). Suddenly the wire flipped over his neck and shoulder. As the sail filled with wind it took a strain on the wire and somersaulted Archie into the sea. I was sure we'd lost him when suddenly he popped up alongside, still clutching the trailing jib sheet as though his life depended on it; and of course it did, for we would never have been able to come about fast enough in that sea to pick him up with his boots full of water."

Commenting on the six years that Fred served as sailing master of *Bolero*, owner John Nicholas Brown says, "He proved himself daily and in every way the greatest master of his subject. There is no one who is more expert in the intricate details of sailing and no one more competent in all the many facets of this fascinating subject."

Leaving *Bolero* in 1955 when she was sold to Swedish owner Sven Salen, Fred signed on for the construction and outfitting of *Figaro* for Bill Snaith, president of Raymond Loewy Associates. She was finished too late for racing in the New York area that year and Fred accepted his present post with Raytheon.

Sea fever and a bid to sail in *Bolero* in the 1956 gambol to the "Onion Patch" saw Fred vacationing his way to Bermuda. It was in this edition of the biennial classic that *Bolero* recorded the fastest elapsed time ever set in the race. It was during this race that Fred's wizardry was brought to bear on an unusual rigging problem that could have dismasted *Bolero* or at least completely ruined her chances of finishing first.

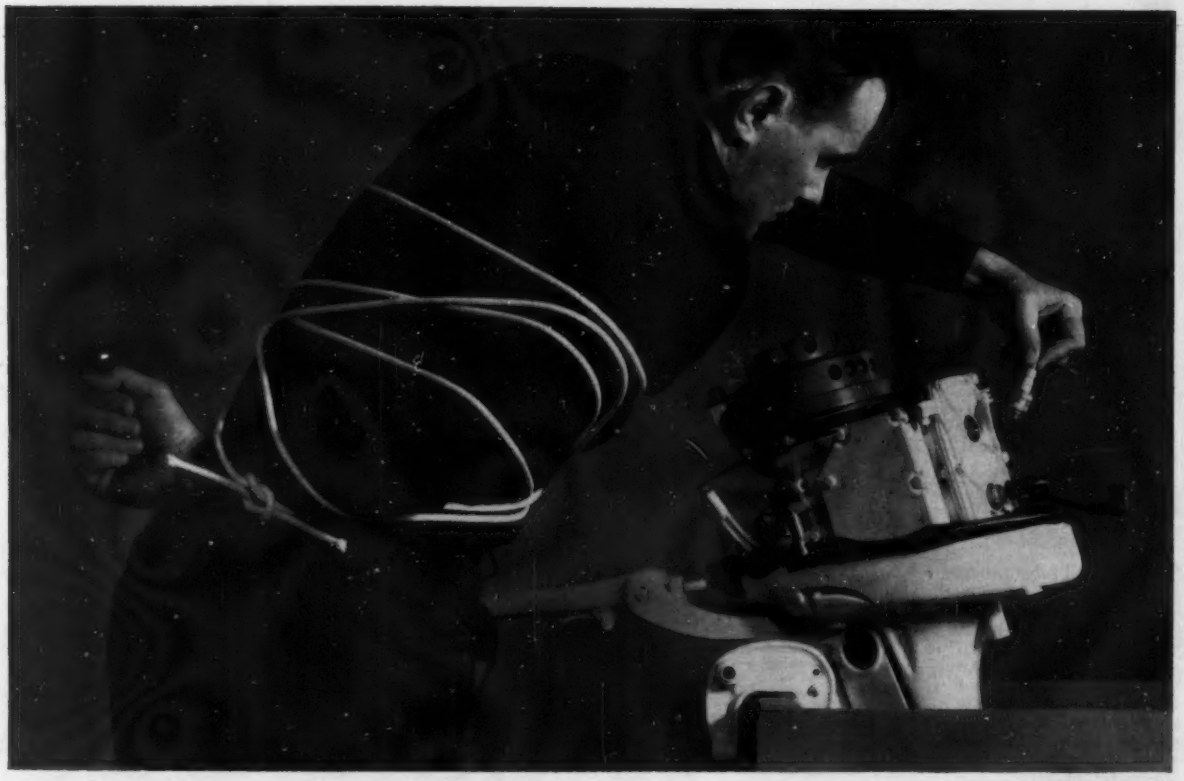
She was running well out front and straining hard when the turnbuckle aloft on the headstay carried away. At the helm, Olin Stephens bore-off to relieve the strain on the mast and give the sail handlers a chance to get in the Number 2 jib topsail. Then a lifetime of marlinspike seamanship went to work. In minutes, Captain Fred rigged preventers using a wire-rope jib halyard and two wire-rope spinnaker halyards. Then he clapped on jiggers and set them up taut. "Everyone responded quickly and ably and we didn't lose too much time. It was a shame though. She could have turned in a really outstanding time record had it not been for the casualty."

It's this preparedness that Fred practices so well himself that is the key to his safety division program. Everyone in boating has an obligation to reach as many people as possible to "sell" safety, he says. "We have to embrace the novice and teach him enough to respect the sea so that he too will be prepared for that moment of decision when he will have to act immediately and solve the problem correctly the first time. After all, he may get only one chance to prove himself."

While he emphasizes the need for exchanging personal hints among yachtsmen and boat owners and the helping hand to new owners, Fred feels that the job can best be done through the present organizations such as the U. S. Coast Guard Auxiliary and the U. S. Power Squadrons. These groups and yacht clubs and boat clubs that offer instruction programs are the surest means of keeping boating as a safe, enjoyable recreation and making it easier on those fishing and commercial operators whose livelihoods depend upon the pleasure boatman's prudent use of the waterways.

Captain Fred points out that there are fewer professionals today. His own case is typical. His first job was in a 215-foot sailing ship with a crew of 39. Although he was advancing in professional stature, each successive assign-

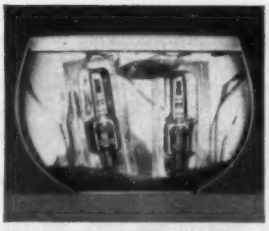
BOATMAN continued on page 34



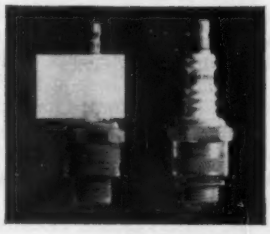
Even with one hand tied behind you...

You can install this Champion marine spark plug without danger of dropping the gasket!

Champion's attached gasket is perfect for changing spark plugs over the water. It's another reason for making plated marine Champions your choice for spares . . .



Only Champion has a *waterproof* pack. After 24 hours under water, these Champions went right in an outboard, sparked it to life on the first try.

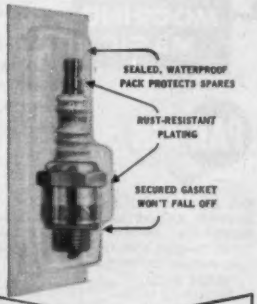


Silvery, rust-resistant plating protects marine Champions. After identical exposure to rust test, ordinary plug (L) corrodes. Plated Champion remains rust-free.

Champion Spark Plug Co.
Toledo 1, Ohio

Champion's new *plated* marine spark plug has an attached gasket that cannot fall off—from the time you open the waterproof packs that keep these Champions clean, dry and ready for instant use, until they are firmly secured in your engine. (Without gaskets to make gas-tight seals around spark plugs, your engine would lose compression and power).

Be sure your marine engine will always have the full-firing spark it needs for smooth, dependable power. For fun and safety this summer, always carry a spare set of the world's finest marine spark plugs—*plated* Champions in the *waterproof* pack.



CHAMPION
SPARK PLUGS

YOU'RE A SAFER SKIPPER WITH A SPARE SET OF CHAMPION SPARK PLUGS

LOOK TO YOUR **PUMPS** . . . a most important part of every boat's equipment

FOR WORK-SAVING CONVENIENCE

A small *utility pump* to do all the small tasks that must be done will save work and trouble, give you more time to enjoy your boat. Every boat, from a fishing skiff to a twin-screw cruiser, needs:

"HANDY BOY"
UTILITY PUMP OUTFIT

The world's most versatile pump! It's the "Boy" that does MORE than a man's job on any boat:

- Drains Crankcases
- Transfers Fuel
- Dries Bilges
- Cleans Oil Filters
- Fills Galley Stoves
- Cleans Out Oil Lines
- Inflates Air Mattresses

or any other pumping job. All brass, with interchangeable neoprene fittings. Complete in plastic stowage bag:

HANDY BOY OUTFIT
No. 3799•$7.25

FOR SAFETY . . . AND BETTER BOAT PERFORMANCE

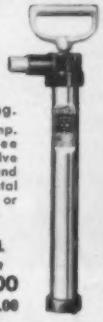
Sure, a good *bilge pump* is necessary in emergencies, but consider this also: Even the tightest boat will take aboard some spray and rain. An inch or two of water under the floor amounts to hundreds of pounds sloshing about, causing poor trim, sloppy turns, sluggish planing, can cost miles per hour.

"SEA MATE"
BILGE PUMP

7 Strokes per Gallon.
Suction on First Stroke.
Never Needs Priming.
No Coaxing or Tinkering.

Highest efficiency of any pump. Full-floating, friction-free plunger. Non-clogging valve and strainer. All brass and neoprene, no metal-to-metal contact, nothing to wear or corrode. Fiberglass handle. 20¼" long, 1¾" cylinder.

SEA MATE UNIVERSAL
incl. 5 ft. neoprene hose
No. 3683 • $14.00
No. 3670 without hose, $11.00



FOR MORE PLEASURE

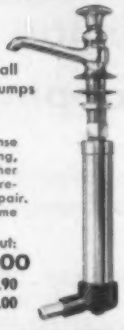
The difference between a balky, hard-to-operate *galley or lavatory pump* and one that always works "right now" could be the difference between a pleasure cruise and the crew's displeasure. If your wife is your "crew" you'll know what we mean!

"GALA"
GALLEY AND LAVATORY PUMPS

The Best Performing of all Galley and Lavatory Pumps at HALF THE PRICE OF ANY OTHER!

Easiest action. Instant response on first stroke—no priming, ever! Simplest to install either as original equipment or to replace pumps in need of repair. All brass and neoprene; chrome plated upper parts.

Style shown, 3½" spout:
No. 4180•$10.00
No. 4205 High Spout, $11.90
No. 4270 Swing Spout, $15.00



MOORING MAGIC

PAR-AIR BETTER BOAT BUMPERS

work like *Mooring Magic* to protect your boat in every mooring situation. Bumpers *slide* on the line, are not tied on. Hang in any position:

PAR AIR

Soft as a toy balloon, tough as a truck tire. Controllable resiliency. Par-Air Bumpers have no rope, ears or grommets. EVERY INCH IS WORKING FACE. Size for size, your boat's best protection and your best buy.

No. 4442 • 2½" x 8" (equal to other 12" fenders) **$ 1.85 each**
No. 4444 • 4" x 12" (equal to other 18" fenders) **$ 4.25 each**
No. 4446 • 6" x 15" (equal to other 24" fenders) **$ 6.75 each**
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PAR-AIR INFLATION PUMP included with every set of 4 Bumpers

At your boat dealer's or write • • •

PETERS AND RUSSELL, INC.
517 W. LIBERTY ST., SPRINGFIELD, OHIO

ment was in a smaller yacht with a smaller professional crew. The change in the professional complement is one of the economic transitions that is making yachting a sport for everyone.

Fred feels that today's professional should be first a seaman and a gentleman with tact, diplomacy and reserve. He's got to be a business man, too, to represent the owner in his dealings with shipyards and the many suppliers that are needed to keep a yacht on the go. He's both ship's husband and purchasing agent.

As in any profession the best ones don't have to apply for a berth. Top-flight experienced skippers are rarely on the beach for any length of time. When the New York Yacht Club accepted a challenge for the "auld mug" in 1957, the 12 metres lured Captain Fred back to sea. His choice of *Columbia* couldn't have been a better one. Once again he found himself following Olin Stephens' blueprints for a 12-metre and checking every piece of material and every construction detail that was to make *Columbia* a champion.

Fred's job was to hire the best professional crew that could be mustered, a good crew to complement the fine team of Corinthians being assembled by Briggs Cunningham and Henry Sears. Fred selected Jim Haslan and Bob Pettway. His choice was influenced by their youth, agility, capacity for physical labor, competitive spirit and their ability to get along with other crewmen in the tense infighting of offshore racing.

Television interviews give Captain Fred opportunity to talk boating and water safety. Here with Jim Britt, Boston sportscaster, he discusses America's Cup races in live introduction to film on Columbia.

After *Columbia* was rigged and outfitted with literally miles of running rigging, Captain Fred turned his attention to training the crew for the summer-long series of races. With Cornelius Shields and Briggs Cunningham alternately at the helm they practiced starts hour after hour while Fred and Rod Stephens drilled the sail handlers forward. The days were long at Newport. Work began daily at 6:30 a.m. and continued until dark.

"As soon as we'd mastered the duties for a particular station, we'd exchange jobs and start all over again. It was like being on a treadmill," says Fred. "But it gave us the opportunity to assign the best man to each job and to acquire the versatility and clocklike teamwork that meant the difference in those dead heats with grand old *Vim*."

The rest of the America's Cup story is well known and represents one more endorsement of Captain Fred. Perhaps one of the most colorful of boatmen, Fred is also one of the most unique for he's never owned a boat! — ⚓

Larson

BOATS...RIDE ON A "CUSHION OF AIR!"

Exclusive lapline design spins a cushion of bubbles under the hull...for more comfort, greater speed, a minimum of "bounce."

THE ALL-AMERICAN. A big 16' family runabout with sealed double bottom and flat floor, one-piece fiberglass hull. Three models, each with convertible top and all accessories, price range: $985* to $1265.

Pour on the power and feel how smoothly a Larson boat answers . . . how lightly it lifts to level planing angle. Swerve around a last-minute snag and note the "bite" of the five laps as the hull corners without slip or sidewash. Get every ounce of "muscle" out of your motor—a unique reverse lap channels *solid* water at your prop for extra speed and thrust.

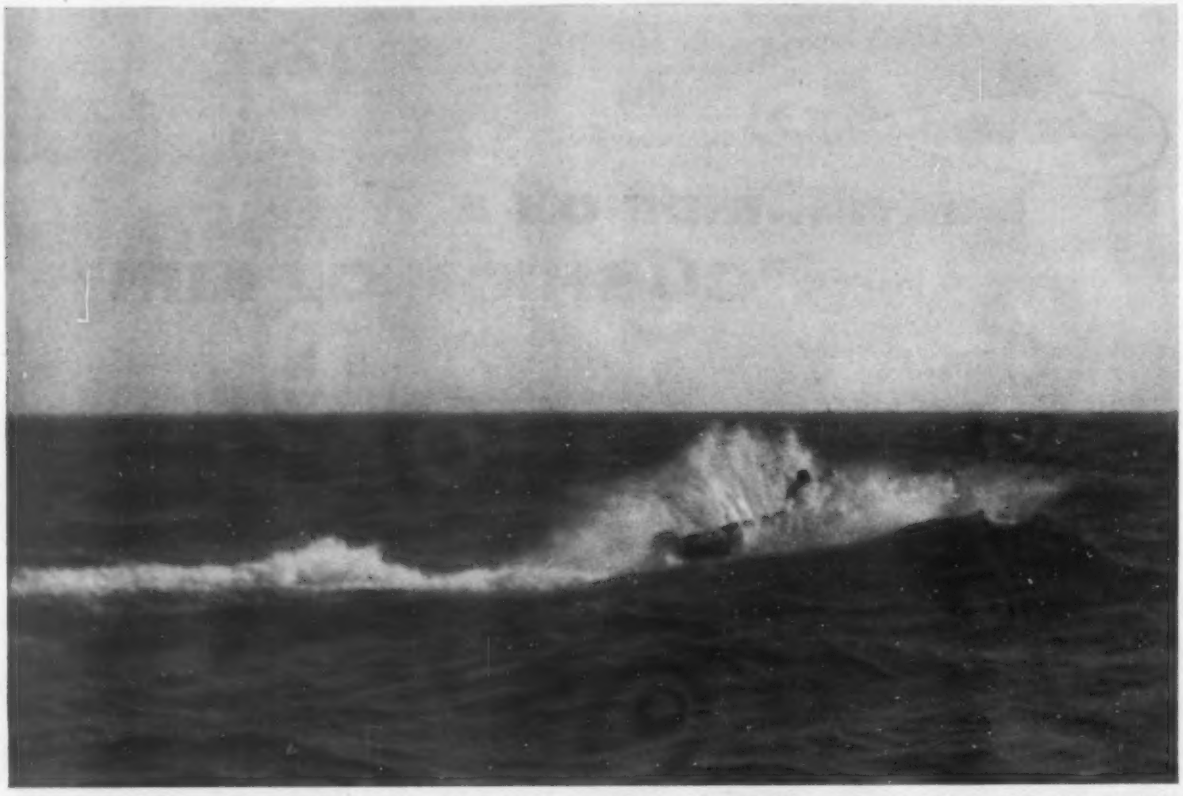
Each subtle line of the "All-American" reflects the inspired touch and careful craftsmanship of Paul Larson—master boat builder for 53 years. And the efficient Rand-Larson fiberglass molding process brings you this magnificent boat at a reasonable cost. Ask your dealer for a family demonstration ride.

*F. O. B. Boat Works. Prices vary according to freight charges.

Notice the difference in...

Larson

Larson Boat Works in Little Falls, Minn. • Nashville, Ga. • Ontario, Calif. • Casper, Wyo. • and Courtaulds Moulded Products of Canada, Limited, Cornwall, Ontario.



Ski jumping off a wave, a contestant in mid Gulf Stream takes a boat-shaking slam into the bottom of a trough.

Across 188 open miles at speeds that make every wave a solid obstacle, this Miami-Nassau event has earned its title as powerboating's . . .

ROUGHEST RACE

By James R. Wynne

ON APRIL 17, 1959 at 7:25 a.m., seventeen power boats ranging from a 16-foot outboard to a 49-foot cruiser headed out Government Cut at Miami for Coral Harbour at Nassau, Bahamas, some 188 miles away.

Past the cut and into the Gulf Stream, bucking into east winds up to 20 mph and seas of 10 to 15 feet, the first casualty occurred only minutes after the start when a 30 foot cruiser with twin 300 hp engines smashed in her bottom and raced back to beach just before going down. Another outboard-powered entry turned around shortly afterward, deciding that discretion was that day the better part of valor. The remaining boats continued bucking and pounding their way toward Cat Cay, 54 miles across The Stream and the first refueling check point.

This was the start of the third annual Miami-to-Nassau power boat race. P-B editor Bill McKeown and I were competing in an 18-foot Thunderbird Miami cruiser with a "Cathedral" sea-sled type hull powered by a single 80 hp Volvo-Penta "Aquamatic." The bronze plaque awarded to all who managed to finish in this contest carries the motto "The most rugged ocean power boat race in the world," and with good reason. This is not a race for amateurs; entry is by invitation only, and this year the race committee had

Fifth to finish overall, fourth in the speed division, first in its single engine class, the author's entry was a "cathedral" hulled 18' Thunderbird Miami, designed by Richard Cole for Plastic Fabrications Co. and powered with a Volvo 80 hp with Aquamatic outboard drive designed by Wynne.

screened 36 applications in order to issue invitations to the best 20—the sturdiest and most experienced of the crop. Such was our competition and, with a single engine boat and lowest power in the race, we figured we were just "along for the ride." In addition we were loaded with equipment for an added 260-mile cruise to the out islands and back, if and when we finished the race.

Why should anyone want to race a small powerboat across 188 miles of open ocean? The answer involves a bit of explanation. First, of course, there's the thrill of competition; pitting your own skill, endurance and equipment against others similarly impelled. This is a very strong lure; my love of racing goes back pretty far—from competition with grade-school buddies on bicycles, through sailboats, cars, and inboard and outboard hydroplanes. But nothing tests a piece of equipment like the stress of racing competition. The greatest automobiles in the world today are direct descendants of competition-bred machines, and in the early days of aviation, speed contests played a vital part in the development of the engines and planes which make up today's air age. Our entry in the race to Nassau had a sound engineering purpose.

Over a year ago, I had begun development work on a marine power plant which would combine features of both the inboard and outboard type units. It would be an outboard drive package; an economical inboard engine combined with an outboard unit which would tilt and steer as a conventional outboard motor. The result was the 80 hp Volvo-Penta "Aquamatic" which was to push us toward Nassau across a very turbulent Atlantic. What better way to test and prove it than in "the most rugged ocean power boat race in the world"?

I had worries on the trip that Bill couldn't share: I knew every nut and bolt, every gear, bearing and shaft in the Aquamatic, but this churning Gulf Stream was far from normal service. And when, half way across The Stream, we found we could gain on a couple of more powerful boats ahead of us, the temptation to ease the throttle past cruise position and see the surprised looks of the crews as we pushed ahead could not be resisted, another reason why racing is such a severe test. As we pulled into Cat Cay, the lead boat in our class, a 30 foot skiff with a 200 hp engine, pulled out—we were right up with the hot ones.

Our Bahamas Customs Ship's Transire reads "Motor Yacht *Miss Aquamatic*, Jim Wynne, Master, Wm. McKeown, Mate, entered Port of Cat Cay 11:44 a.m., cleared 11:46 a.m. bound for Nassau via Frazer's Hog Cay." From Cat Cay, the course is "over the banks"—96 miles of open water averaging only 12 foot deep. The wind raises an ugly steep chop here and we were heading straight into it—really brutal going. We were not too surprised to see a boat running just ahead of us suddenly turn around and head back to Cat Cay. As they came abeam they motioned to us and we stopped to see if we could offer assistance. One of the crew had suffered a sprained back from the brutal pounding and was in great pain. They were taking him back to Cat Cay and asked us to notify the Miami Coast Guard—they had been unable to get through on their own shaken radio. We had a 100 watt RCA set but I wondered if it still worked after the beating it had taken going across the Gulf Stream. However the Coast Guard answered my call immediately, and as we took off again it was a very comforting feeling to have that radio and know a plane would be getting into the air to pick up the injured man.

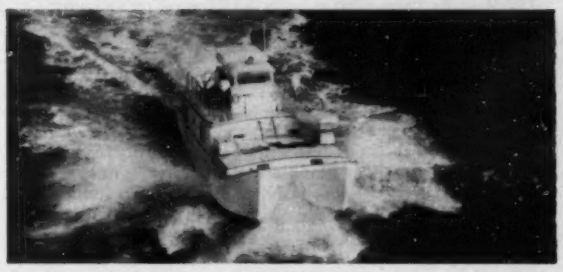
The hours went by slowly and the miles passed. Late in the afternoon we spotted Northwest Light, a little tower in the middle of nothing but water and our first navigational checkpoint and sight of anything but water in 75

RACE continued on page 38

First place speed winner was 27′ fiberglass Crystaliner powered by two 230 hp Chevrolet Corvettes. Skipper Gordon Hoover drove his utility to new record time of 8:04.

Forest Johnson finished only one minute behind Hoover for a total time of 8 hours and five minutes in his 34′ Prowler Craft, Tooky, powered by twin 300 hp Cadillacs.

Only three minutes behind the winner into Coral Harbour came Sam Griffith in the new 35′ Enterprise sports fisherman Kim Maru, with two 275 hp Crusader Cadillac engines.

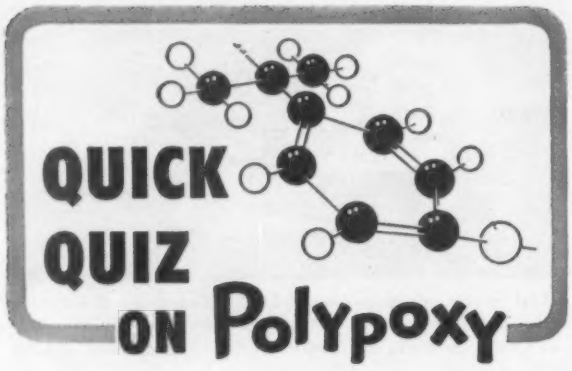


First to finish in the predicted log contest and fourth overall was Ralph Worthington's outstanding 49′ cruising catamaran. Rough seas failed to deprive her of 2nd place.

Equipment for Author's Boat Included:

Life jackets	Enicar Sherpa Diver watch
Life raft air mattresses	Mo-Par hand searchlight
RCA 100 watt radio/telephone	PAR bilge pump
RCA Portaguide R.D.F.	200′ nylon line
Gator Trailer	Spare engine parts
Aqua Meter speedometer	Emergency food, water
War surplus compass	Foul weather gear
Roselle Anchors	Sea & Ski lotion
Morse single-lever control	Falcon distress flares
Binoculars	

All boats had to pass Coast Guard Auxiliary Courtesy Exam



Q. What is Polypoxy?

A. An entirely new kind of marine paint—developed and tested by the Pettit research laboratory and incorporating the miracle qualities of the new epoxy plastic resins into Pettit's famous line of Shipendec hull and deck paints.

Q. What does Polypoxy do for boats?

A. Gives surer protection plus more gleaming beauty than ever before. The tough Shipendec Polypoxy finish has superior abrasion resistance and unparalleled gloss and durability. It adheres to any clean surface without treatments or primers.

Q. Is it easy to apply?

A. Couldn't be simpler. You just pour together *equal parts* of pigmented base A and hardener B from matched pint or quart containers (guesswork is gone), let stand one hour—and brush on. Or, if you prefer to spray, substitute Spray Hardener Part B. After mixing, Polypoxy has a usable life of 24 hours.

Q. Will it really stand up?

A. Longer than any other marine paint you can buy. In fact, one coat of Shipendec Polypoxy will give your boat truly "beautiful protection" for many seasons.

Q. Can I get Polypoxy in the color I want?

A. Yes, indeed. You have a rainbow of Shipendec colors to choose from—Lemonade, Bikini Blue, Tahiti Coral, Bright Red, Green Mist, Newport Green, Platinum as well as Black and Clear, and a new color —Bayou Beige. Also, Polypoxy fillers are available for use with Clear in creating natural wood effects.

Q. Sounds swell for boats—any effect on the boat owner?

A. The very best kind—immediately upon launching, equal parts of pride and pleasure react to form a Polypoxy smile visible for miles . . . in any kind of weather.

PETTIT
marine paint
Pettit Paint Company, Inc. BELLEVILLE, N. J. • SAN LEANDRO, CAL.

miles. This was to be the downfall of several of our competitors, who did not sight the light and zig-zagged around looking for it until they ran out of fuel. Just after dark, with the aid of our powerful spotlight, we found the channel and pulled into the dock at Frazer's Hog Cay. Sam Ragland, manager of the Berry Island Club, was waiting

Fitting out Miss Aquamatic at Plastic Fabrications Miami plant, additional handle grips were attached, equipment secured against pounding seas, poles installed to convert cockpit cover into tropic awning (another Wynne invention) for the Nassau to George Town cruise, USCGA exam was passed as required of every entry in the race.

to greet us and as we gassed up he told us news of the race.

"You're the fifth boat to come in here," he said; "no other single engine boats and no outboards! Are you going on across tonight or wait for morning—it's pretty rough out in the Tongue of the Ocean."

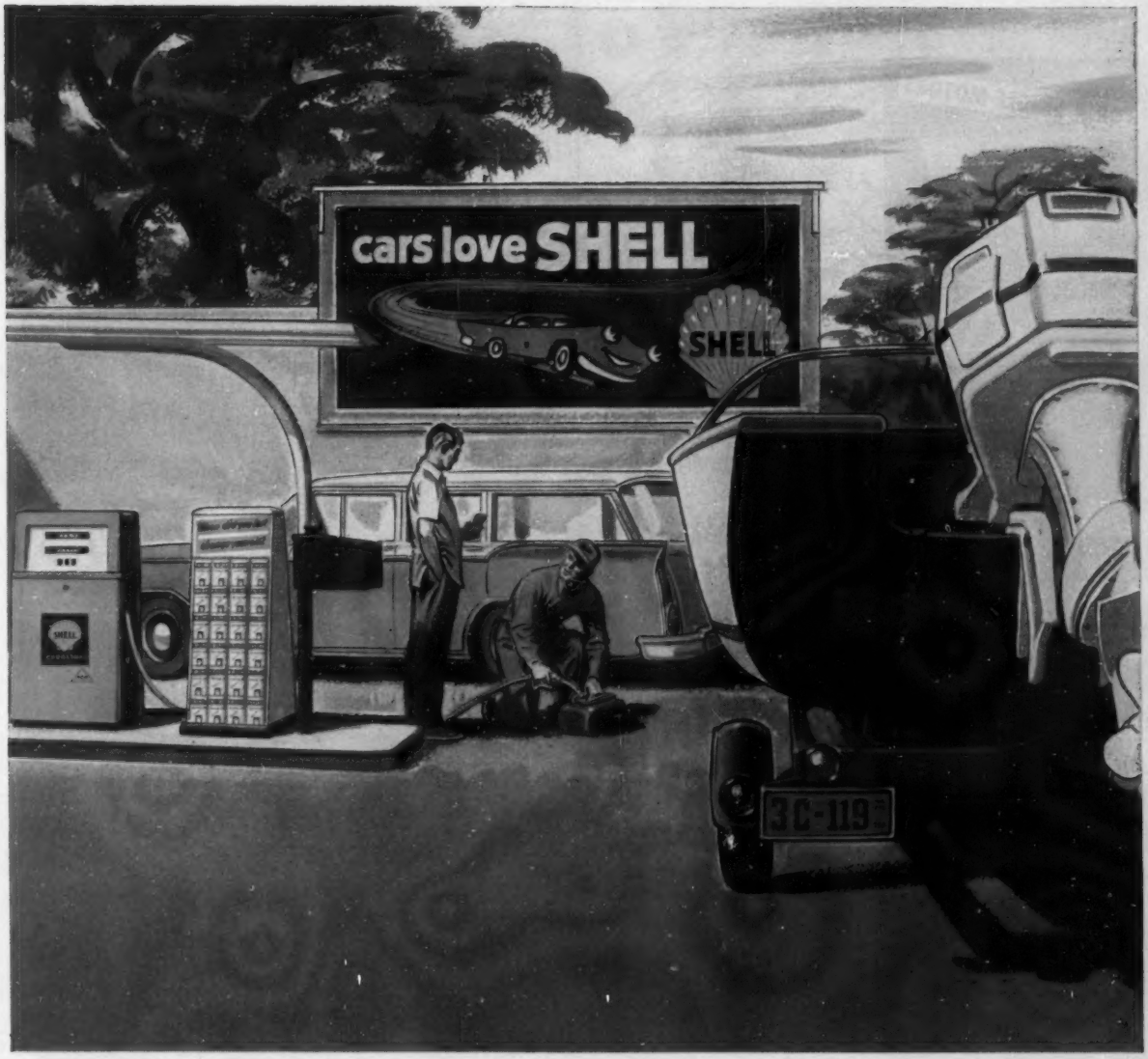
"We're going out," we assured him, realizing for the first time how far up in the race we were. Just after 8:00 p.m. we waved goodby to Sam, pushed the throttle open again

Though speed required a light boat, equipment to be loaded aboard filled most of the back of a station wagon. Tool kit, large funnel, freon horn, life jackets, 200′ of nylon line, emergency flares, Roselle anchor, RCA R.D.F. were included.

and headed out into the home stretch—and the most rugged.

The Tongue of the Ocean is a wide chasm which splits the islands of the Bahamas. Over 9,000 feet deep in places and connected at the North to the open Atlantic by Northeast Providence Channel, really huge seas build up in this

RACE continued on page 40



and Outboards love Shell, too!

Modern outboard motors, like modern car engines, are subject to spark plug fouling. That's why Shell Gasoline contains TCP additive—to neutralize the harmful deposits that cause spark plug fouling and power loss.

Look how far ahead you are when you buy Shell Gasoline with TCP* and Shell Outboard Motor Oil at your Shell Service Station.

- **You're pretty sure to save money compared with dockside prices**
- **No waiting at a dock for service**
- **One stop takes care of your car *and* your outboard**

NOTE: Charge with your Shell Credit Card. You don't have to carry cash, and your receipt provides a record for any tax refunds.

Your boating dollar goes farther with SHELL
—and so do you!

SHELL

*Shell's trademark for this unique gasoline additive developed by Shell Research.

FOR SINGLE MOTORS
MODEL "MW" Right or Left Mounting
PUSH to go Forward
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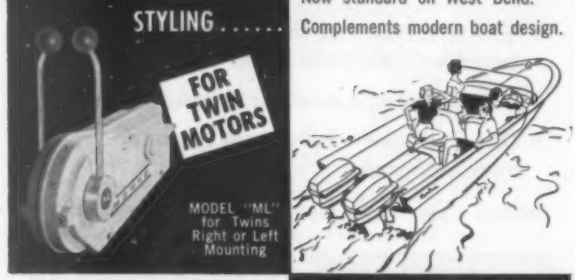
MODEL "ML" Right or Left Mounting
ENJOY MAXIMUM
SAFETY AND PLEASURE

MORSE SINGLE-LEVER OUTBOARD CONTROLS

SINGLE LEVER	Controls both shift and throttle.
PROTECTS MOTOR	Clutch cannot be disengaged or reversed without first closing throttle.
SAFE - INSTINCTIVE	Your boat moves with the lever—forward as the lever is moved forward and backward as the lever is moved back.
MOTOR STARTING	Adequate throttle range in neutral for starting and warm-up.
ALL-MECHANICAL	With the famous, time-proven MORSE-ACTION.
SIMPLICITY	Only two basic moving parts. Friction and backlash reduced to a minimum.
FOR MOST MOTORS	For your Evinrude, Johnson, Buccaneer, Mercury, Scott and Oliver. Now standard on West Bend.
STYLING	Complements modern boat design.



MORSE Type "O" OUTBOARD DOCKING LIGHTS

Mount BELOW your deck line to guide you safely to your dock at night.

The **MORSE** Instrument Co.
39 Clinton St., Hudson, Ohio

SEE YOUR DEALER OR WRITE FOR LITERATURE

body of water. We had 38 open miles of it to go on a very black night.

As we cleared the lee of Bird Cay, just southeast of Frazer's Hog, we felt the first surge of the Tongue—and the boat began to feel more like a roller coaster. We couldn't see the seas and it's probably a good thing—we might have turned back. Earlier in the trip we would have,

After several delays from storms, skippers gathered at 7 a.m. on Miami Dupont Plaza's hotel marina for final briefing on course, weather, and emergency procedures by Sandy Hiss and starter Kurtz Henley. Author-engineer Wynne (white cap) is at right of designer Cole, builder Woodson.

but by now our confidence in our cruiser's hull and engine was such that we felt no qualms in rushing on. We settled down, with the comforting red and green deck reflection of the bow light and the glow of the compass light intensifying the inky blackness of the night. We were aiming for the southwest tip of New Providence Island, on which Nassau is situated, and if you miss this tip, there's no other land for a few more hundred miles. Since I couldn't see the hissing crests, I kept my eyes glued to the compass while Bill kept the lookout. We had the seas quartering on the port bow now and the boat rode beautifully; after about three hours we sighted Goulding Cay Light, dead ahead on course, and soon were in the lee of New Providence Island for the remaining few miles to Coral Harbour.

We located the channel into the harbor, eased into a quiet slip and found only one waiting person on the dock to greet us. Happy, but rather disappointed at our reception, we allowed ourselves to be led to the bar where the real welcome was waiting. No one had expected more finishers that night, but amid midnight yells and calypso music, Planter's Punch transfusions slid smoothly down our throats, first "food" since 17 hours before.

We had finished first in our class (for all single engine inboards up to 30 feet) and 4th in the over-all speed division of the race behind three of the fastest twin-engine

RACE continued on page 42

PRESENTING THE *Ballerina*

14' BALLERINA, light and graceful new runabout combining fast action and maneuverability with extreme stability in choppy waters. A beauty styled for speed, comfort and economy.

Hottest New Boats of the Year....

Bell Boy for '59

There's beauty in every sleek line of the new Bell Boy models for 1959...and they're as good as they look, combining powerful performance, assured family safety and new comfort features with fresh, free design! Newest of the all-Bellglas models for 1959 from Bell Boy is the graceful Ballerina, a handsome runabout, specially designed for the "economy minded" boating crowd! All the new Bell Boy boats for 1959 feature rugged triple-braced transoms, self-draining motor wells, roomy new stowage! 1959 is a great year to step up to a Bell Boy!

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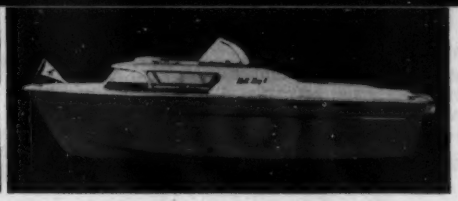

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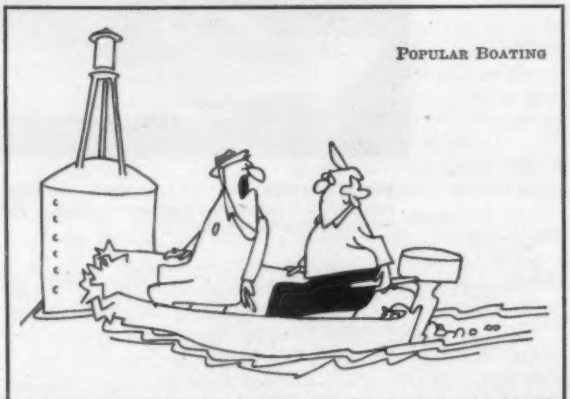
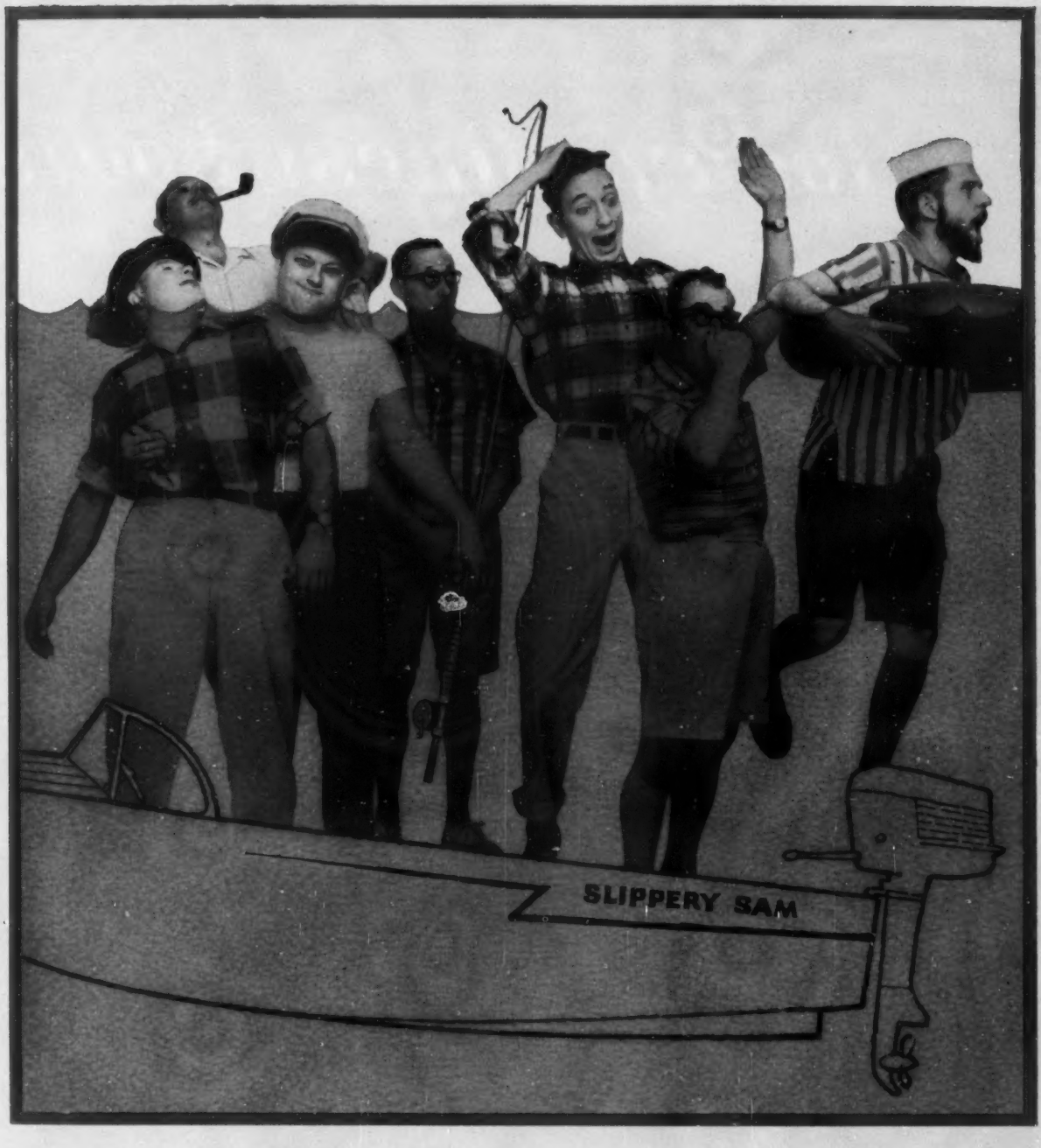
The Bahama Banks, 96 miles of shallow light green water, had their own battering wave structure. Ed Joyce drives a leaping Thunderbird through it while Bob Cox tries to take less of a beating by holding on while standing up.

cruisers in the country. The first of our "unofficial competition," a twin-engine outboard with similar hull, didn't come in until 12 hours later. All told, only nine of the seventeen boats finished the race. We had proved what we set out to prove. — ⚓

First and only outboard to finish race arrives 12 hours after Wynne and McKeown at colorful Coral Harbor Yacht Club. First comment of bruised, sun-burned and salt-caked Cox and Joyce: "So this is popular boating?" But showers club, and Nassau soon made race hardships worthwhile.



"Congratulations! You've hit the only buoy in the bay."



The day the "Slippery Sam" took a peep at the deep

Someone should have counted heads before the "Slippery Sam" pulled away from the dock. Although no well-constructed craft is likely to go down this easily, overloading can cause serious trouble. When a boat is overloaded, any sudden shift of weight or even cross swells can cause it to tip over easily. Be sure you know the exact capacity of your boat *and* see to it that it's never exceeded.

Be sure, too, that your outboard motor is in top working condition at all times. For "Happy Cruising" insist on clean-burning Esso Outboard Motor Oil. It reduces harmful engine deposits . . . cuts down on friction and wear. You'll find the one-quart screw-top can a real convenience. Get Esso Outboard Motor Oil from your Esso Marine Dealer or from the Esso Dealer who services your car.

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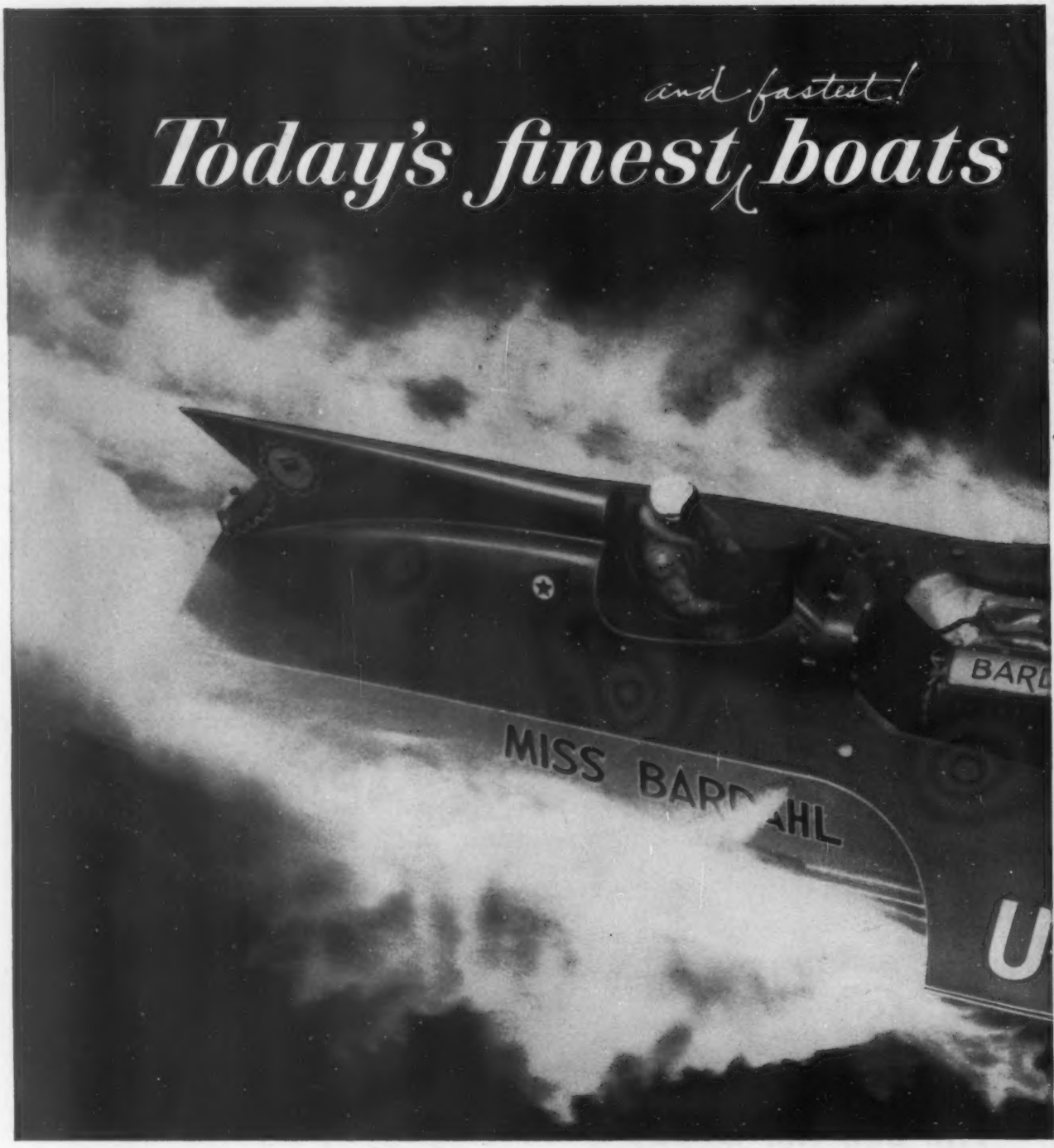


Designed and built by Ted Jones, Miss Bardahl is driven by Miro Slovak. Owner: Ole Bardahl,

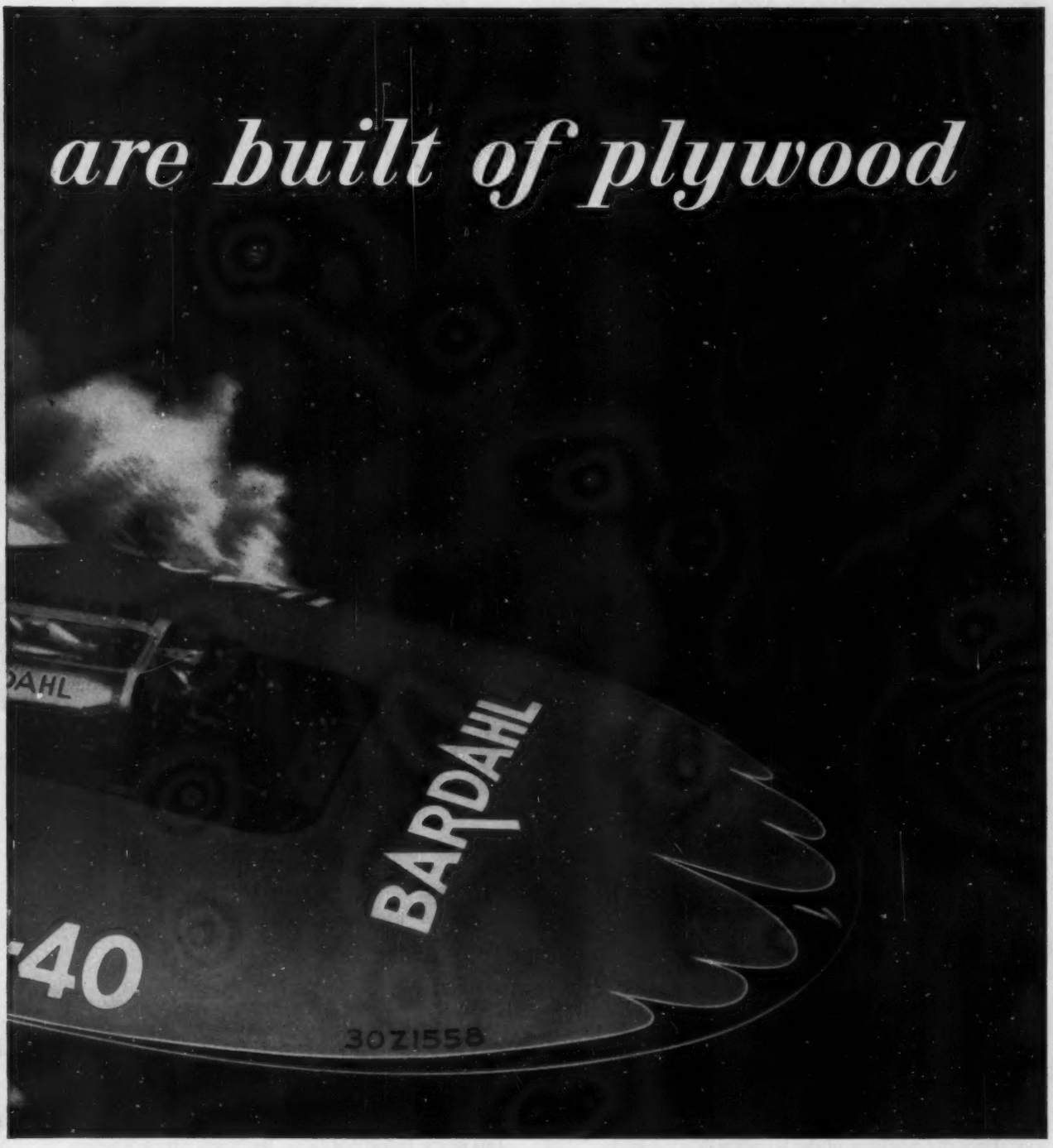
1958 Unlimited Hydroplane Champion Miss Bardahl is a well-stacked plywood lady. She thrives on fast and rough going.

UNLIMITED CLASS HYDROPLANE RACING is the ultimate test of boat design and performance. The big craft are subjected to an incredible beating as they slam into turns at top speed, wheel and fling 200-foot long rooster tails as they rocket through the straightaways at 170 m.p.h. plus.

It takes really rugged construction to stand up under this kind of punishment. That's why Miss Bardahl, 1958 Unlimited Champion, like almost all racing hydros, is built of Exterior plywood. Inside and out—hull, decking and bulkheads—the Bardahl relies on plywood to provide strength and stamina without the penalty of extra weight.

When you start thinking about *your* new boat, remember

are built of plywood



Bardahl International Oil Corp., Seattle, producers of high-performance oil and gas additives.

the same solid plywood construction that makes Miss Bardahl a champion in her class will give you winning performance and value in yours.

See your boat dealer soon. He'll be glad to show you the latest plywood makes and models. Take a ride and see for yourself what a difference fine plywood construction can make. You get *time-proven* performance: speed, comfort and safety—and none of the brittleness, drumming corrosion or repair problems you get with plastic or metal. And not only do you get more in a fir plywood boat, you actually pay less. Model for model, feature for feature, you can save up to 25 per cent with a boat built of Exterior fir plywood.

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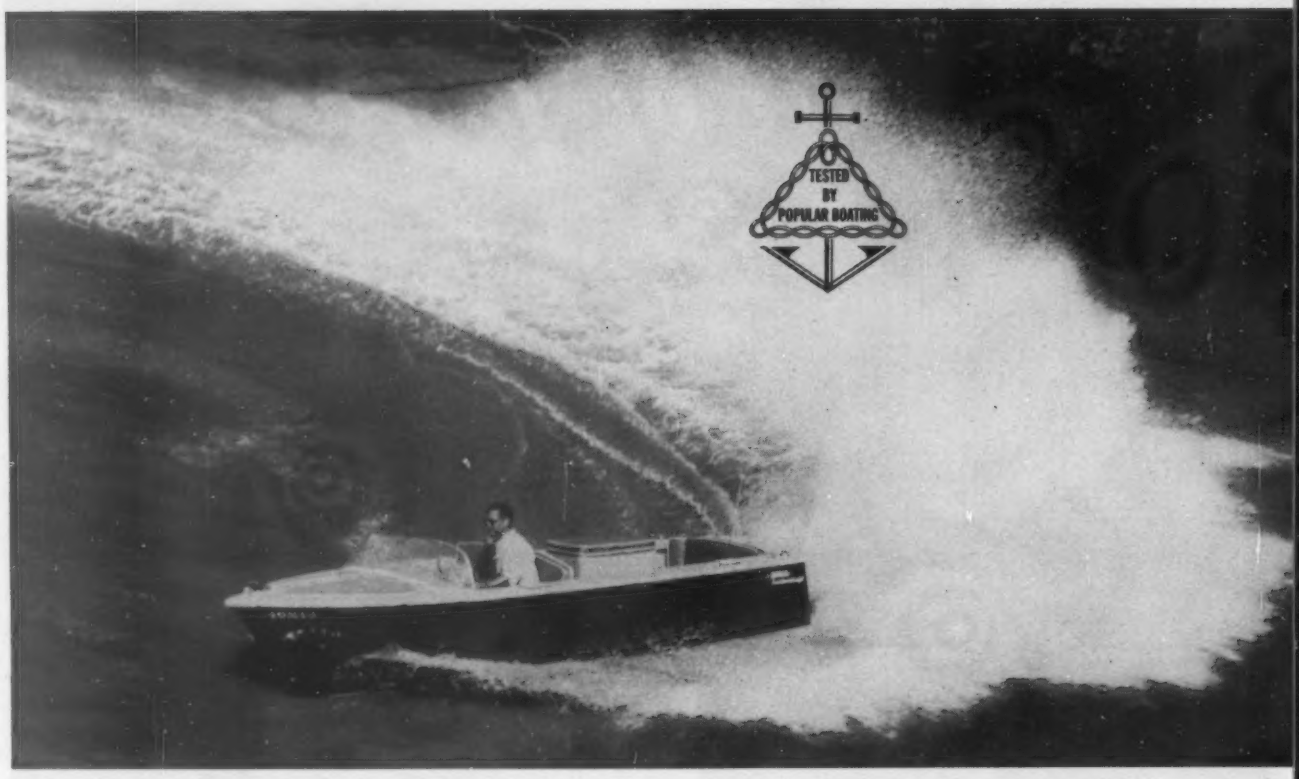
Whether you buy or build, be sure all plywood is genuine EXT-DFPA waterproof Exterior plywood. (Comes in several grades, including solid-core "Marine" grade for planking.) It's used by all reputable boat manufacturers.

DOUGLAS FIR PLYWOOD ASSOCIATION, TACOMA 2, WASHINGTON



At 32 mph, the Turbocraft's top planing speed, it can make a 180-degree turn in its own length. Even a slight twitch of the steering wheel throws up a rooster tail like a racing boat. At slow speed the boat's performance is docile.

POPULAR BOATING tests a:

BUEHLER TURBOCRAFT

By Hank Wieand Bowman

THREE MEN TEAMED together in recent months to make a concerted effort to change the complexion of pleasure power boating. The trio have oddly unrelated interests. The first, Bill Hamilton of Christchurch, New Zealand, is a hydraulic industrialist and ex-auto racer who scored wins on England's famous Brooklands Speedway. He is the developer of the Hamilton Marine Jet.

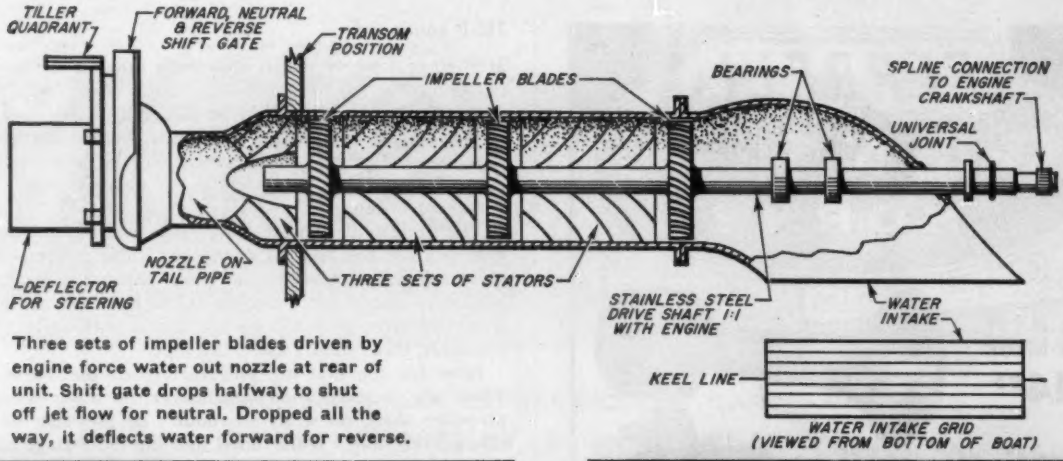
Second member of the triumvirate is 31-year-old Bill Austin of Horse Cave, Kentucky, a University of Kentucky graduate in Civil Engineering. Bill Austin is a "caver." He has devoted himself to underground exploration as a profession, a vocation that is sort of upside down mountaineering in the dark. Last year Bill was a member of the International Geophysical Year Expedition to the Antarctic, for which group he served as surveyor and explorer of crevasses. The expedition had its staging area in New Zealand. On Bill Austin's return from the Antarctic, he vacationed in New Zealand, heard of the Hamilton Marine Jet boats, and after his first ride in one he immediately became an enthusiastic booster of jet boating.

The third member of the group, and the man who is responsible for the creation of this month's test boat, is John Buehler, president of the Indiana Gear Works, Indianapolis. Buehler saw some photographs taken by Bill Austin and published in a men's magazine. He contacted Austin, discussed the potential of water propulsion, and sent Austin as his emissary to New Zealand to contract for the exclusive manufacturing rights in the Western Hemisphere for the C. W. F. Hamilton Company Limited's propulsion unit.

This was in January of 1959. Buehler is a man of action, from his favorite sports of fishing and big game hunting to his prime business, the creation of precision gears and allied components used in aircraft and rocket engines. In fact Buehler's gears are now meshing their way around in outer space, for the present United States satellites are fitted with pumps powered by Indiana Gear Works products.

Between January and the time we conducted tests in May, Indiana Gear Works' activities have taken on a radical change of complexion. A new subsidiary has been formed, Buehler Turbocraft, which is already turning out production models with a planned schedule through to the end of 1959 of at least 750 units.

The idea of a jet powered boat is not new. A fellow by the name of Archimedes played around the idea of jet propulsion in 250 B.C. His idea was a tube with a hand-turned corkscrew device inside of it that operated like a sort



Three sets of impeller blades driven by engine force water out nozzle at rear of unit. Shift gate drops halfway to shut off jet flow for neutral. Dropped all the way, it deflects water forward for reverse.

POPULAR BOATING

SPECIAL REPORT

RATING FACTORS BOX SCORE	Excellent	Above Average	Average	Below Average	Poor
Safety	✔				
Comfort		✔			
Adaptability			✔		
Durability	✔				
Styling			✔		
Performance	✔				

Test author Bowman ducks flying branches as he drives boat through willow thicket with no effect on hull.

One of the most exciting developments in pleasure boating in many years, this 16-foot runabout can be planed through less than three inches of water, or driven over floating logs and debris

of manually-turned coal stoker. But the pleasure boatmen of Archimedes' era stuck to the chained slaves and oars as more satisfactory motivating power and Archimedes' jet package went unheralded.

There have been a number of commercially available jet powered units on the market in recent years. Though not failures, these have been products that we at POPULAR BOATING could not work up sufficient enthusiasm about to feel they warranted a place in our test pages. Their maneuverability was usually limited, speeds were disappointing, and all too frequently the jet packages resembled plumber's nightmares.

Any search at the U. S. Patent Office will reveal literally dozens of North American patented jet propulsion devices, tracing back as far as the late 1800s. Yet from way down under in New Zealand comes what strikes us as being one of the most exciting new developments in pleasure boating in many a year.

The boat tested is the first production model Buehler Turbocraft. And this month the first models of the Turbocraft are being shipped to marine dealers.

The initial boat is a 16-footer centerline measurement, fiberglass construction of conventional monohedron design with a V-ed bow. At rest and viewed from the bow or abeam, the Turbocraft looks like a conventional inboard runabout. Part of the aft cockpit is occupied by a neatly cowled, upholstered-top motor box. The boat is fitted with front and rear cockpit seats, foredeck, and sports a neat appearing plexiglass windshield. Viewed from the stern, it looks somewhat unique because a bit of unusual hardware is affixed to the transom, centered above and about an orifice with a kitchen fan appearance.

The turbocraft carries a price tag of $2900, has a dry weight of approximately 1700 pounds, can seat five comfortably, six in a pinch, and once underway loses all comparison with either conventional inboard or outboard units.

Performance of this boat is excellent, and is its most interesting feature. We will report on this immediately and at greatest length.

The initial 16-foot Turbocraft is fitted with a Model F six-cylinder Ford industrial 223 cubic-inch displacement engine with 7.8:1 compression ratio. It is of nearly a square design, 3.62″ bore and 3.6″ stroke. At 2800 rpm the engine develops 107 horsepower and a dynamometer torque of 200 pounds-feet. The power plant is capable of 138 horsepower at 4000 rpm. On the test boat, the engine peaked

TEST continued on next page

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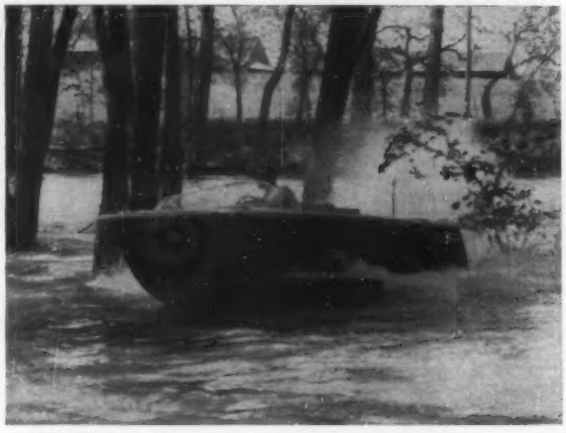
at 3300 rpm where it had been dyno rated to develop 122 horsepower.

Similar Ford engines will be installed in the initial run of production 16′ models. However, before many more months have passed, Turbocrafts will be available in a range from 12′ utility models to 40′ cruisers with a wide choice of engines.

The Ford engine installation, while a sound and reasonable one for the boat, is of no particular interest in our report. What is, however, of special interest is the Turbocraft's jet installation. Known as the Chinook model, the water jet drive is of three-stage design with three sets of impellers, three stators and a tail pipe.

Now for the first big plus feature of the Turbocraft. There are *no underwater appendages*, no water scoop, no propeller shaft, no strut, no rudder, no propeller or even tilt-up lower unit. Water flows into the multi-stage turbine through a stainless steel grid mounted flush with the bottom of the boat. The water-intake grid is even tougher than the heavily reinforced fiberglass bottom. The boat can be planed through less than 3″ of water, driven over floating logs and debris without any fear of propulsion unit damage. There's just nothing to damage.

In the actual performance tests, we gave it as tough a



Note riff of shallow water as Turbocraft powers across a shoal. No propeller-driven boat could come through a test like this unscathed.

test of *durability* as the manufacturer's own test crews had given Turbocraft prototypes on test runs of white water rapids on the Salmon River. We not only ran the rig over submerged stumps and logs, floating logs and debris, but jumped it over tree limbs 8″ to a foot above the water's surface, tooled it full bore through willow thickets, up rapids with rocks exposed nearly at the surface of the water in some instances and over shallows scarcely dew wet. This proved to be a test not only of the power plant and its durability but the hull as well. Both came out with top honors.

The boat pulled three water skiers with no difficulty, peaked out to 32 mph, with two aboard—driver and passenger, neither sensational nor sluggish for its power but full up to expectation.

The boat first off is fun to drive. For the show-off operator a slight twitch of the steering wheel will toss up a rooster tail like a racing boat. For the more conservative boatman, it behaves as docilely as a Tunnel of Love barge.

Steering is simple and smooth; it's consummated by a set of deflectors or vanes, vertically mounted and swivelled like gates by conventional cable-pulley type steering. Deflect the tail stream to the right and the bow turns right and vice versa.

TEST continued on page 50

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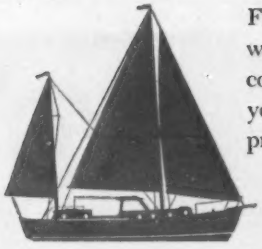

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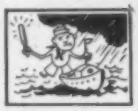

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There is no gear box, yet the boat is fitted with full neutral, forward or reverse which operates in a simple fashion that eliminated any maintenance problems or probability of breakdown. A gate valve or shutter does the entire job. When the gate is centered, the boat is in neutral for the jet blast of water which gives the thrust that drives the boat is shut off. When the gate is drawn upward, the axial flow of the jet stream of water is directed aft and the boat responds by immediately moving forward. At the bottom of the gate is a curved slot-shaped opening directed toward the bow. If the gate is dropped all the way, the thrust of the jet stream is directed forward and under the hull, and the boat moves in reverse.

The function of the engine is simply to power what amounts to a centrifugal pump and to control speed of the pump impellers by varying the speed of rotation of the shaft to which the three sets of impeller blades are affixed in the jet housing. Linkage between the engine's crankshaft and the water-jet package is a universal joint so no alignment problems can harass the owner of a Turbocraft. The outfit can be trailed without fear of springing a prop shaft because it doesn't have one to spring.

I had certain questions in mind and more than a bit of skepticism before I drove the boat. You may have many of the same ones. First of all, the question of sound level

Turbocraft has a neat, clean-cut appearance, is nicely finished. Craft rated an average in styling.

is a normal one. The Turbocraft has the same piston driven engine exhaust noise you would expect to hear from any inboard of similar power. The engine which drives the jet unit vibrates, and vibrational noises are just as apparent as in any other inboard. You don't move over the water's surface with a silent swish.

What kind of steering control can you expect from the deflector vane arrangement? The Turbocraft has a somewhat different helm response from other boats. Since there is no boat torque due to propeller rotation, if you remove your hands from the wheel, the pressure of the jet water being expelled from the tail pipe automatically centers the steering vanes and the boat seeks a straight-ahead course, in much the manner that camber of a set of automobile wheels causes an automobile to self-center its steering. This explanation, of course, discounts unbalanced tire pressure on the car's wheels or strong wind and wave reaction on the jet-propelled boat. In general, however, the boat will hold a true course without any need for correction.

The Turbocraft tested could be turned at top planing speed at an Aqua Meter recorded 32 mph in its own boat's length. This is due in part to a 9 degree deadrise at the after planing surfaces and to the absence of any underwater parts attempting to trip the hull. To prevent a stern wave

TEST continued on page 52

In outboard's toughest competitions, why are the winning boats almost always made of plywood?

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Quiet and comfortable riding. Takes hull-spanking seas quietly. Cool and glare-free in the brightest sun.

Luxurious beauty. Nothing matches these choice wood grains for eye appeal.

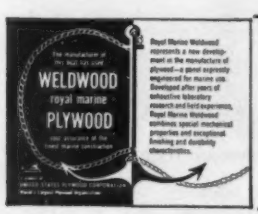
Finishes well. Takes and holds paint or varnish beautifully, and does not become pock-marked or porous in normal wear and tear.

Highly rot-resistant. Withstands fungus and oils—and is guaranteed against delamination *for the life of your boat.*

Light weight and more speed. Has more strength per pound than synthetics or metals. A boat of given strength weighs less.

Easy to repair. Strong and durable; yet if damage should occur, is easier and less expensive to repair *permanently* than metal or synthetics.

Time-tested, time-proved. Weldwood Royal Marine Plywood is made—and backed—by over 40 years' know-how of United States Plywood Corporation, the world's most experienced plywood organization.



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and turbulent water caused by this abrupt turning from swamping the boat at the stern, all you need to do is to maintain a bit of pressure on the foot accelerator and the jet stream will hold any following wave at a safe distance, or you can blow the following wave almost 10 yards aft by gunning the engine to nearly full.

Cavitation—if you can term it that with a propeller-less boat—can occur in an abrupt turn if you corner so hard that the hull performs a high speed hairpin and allows the stern to lift so the boat planes stern foremost in an aft direction. Such a violent maneuver can cause air to be sucked into the intake rather than water and the suddenly unloaded engine, with the jet pack pumping air rather than solid water, will over-rev momentarily and lose thrust. After any boatman takes a half dozen experimental turns, he will quickly get the feel of just how much acceleration to apply to the foot pedal in a turn. Skating backwards will be no more a part of normal operation than purposefully stalling and spinning out an aircraft.

In a normally radiused turn, the boat banks like any semiplaning hull. However, since it is free from torque reaction and underwater appendages the boat does not have a tendency to porpoise and corkscrew its way through the turns as occurs with some relatively high speed runabouts.

In controlling the boat, you will learn to drive it in much the manner that one would drive a sports car on a dirt or gravel surfaced road. Your control is a combination of water stream deflection and water stream thrust. You can increase the boat's turning arc by tromping harder on the accelerator and adding more thrust.

Tests were conducted on the White River, which flows through Indianapolis. I quickly realized, since there were propeller driven boats on the river, the considerably greater flexibility offered by the Turbocraft. I was able to cruise into areas and for miles upstream into sections of the river that could not be safely navigated by any propeller driven craft without danger of banging up wheels, shearing pins, or damaging struts and rudder assemblies.

Over-accelerated in a turn, stern may lift, allowing Turbocraft to skate backwards for a few moments.

Though the boat was originally conceived for use on swift white water stretches, rapids and shallow New Zealand mountain streams, rivers and lakes, the Turbocraft's performance and basic characteristics would make it seem suited for nearly any type of pleasure boating. Lacking a propeller, it offers a safety factor especially for water skiers, skin divers and swimmers. Fishermen will like the unit since it will not snag fishing lines and will allow them to operate in waters impenetrable for propeller driven craft.

Initial price compares favorably with either outboards or inboards of like size and power, yet it frees the operator from many of the maintenance problems inherent to propeller driven craft. Driving the boat offers much the same thrill that you would have in running a four-wheel drive jeep

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Freeport, L.I., N.Y.—36' Merritt Sports Fisherman—Owner George Sarant reports: "The new 240 hp. Interceptors are equipped with 1.91:1 reduction gears and 20x20 wheels. After 100 hours the performance is startling. The boat seems ready to go into orbit! After owning 37 boats, this is tops in economy and performance!"

Lorain, Ohio—40' Richardson—Owner Walter B. McAllister says: "Previously, we had two 185 hp. Interceptors in our 34' Richardson. They proved smooth-running and economical. The new 240 hp. Interceptors in our 1959 40' Richardson Cruiser give equally fine performance. With 2.50:1 reduction gears and 22x23 wheels, it is so quiet you almost have the sensation of sailing."

Los Angeles, California—40' Matthews—Operates almost like a runabout, reports the owner, with her two new 240 hp. Interceptors equipped with 1.91:1 reduction gears, 20x20 wheels and hydraulic transmission. The light weight, compact Interceptor power concept pays off in more efficient operation, more economical performance, and more fun from your boat.

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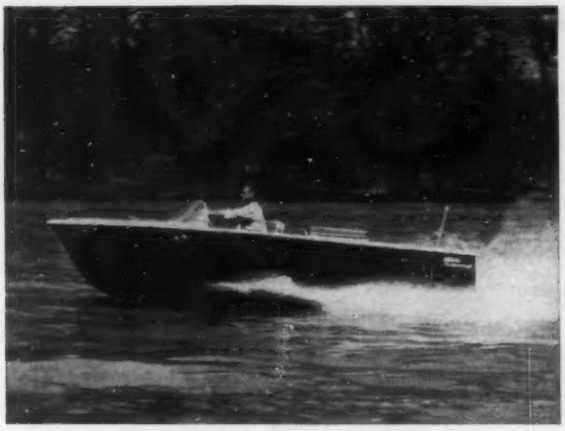

Viewed from abeam, Buehler jet boat looks like a conventional, propeller-driven inboard runabout.

across open terrain and through brush. It's fun, it's practical and it's exciting.

However, this is no Sherman tank nor was it intended to be. Like any other boat, if it's run at speed onto a jagged rock, the hull can be holed. It should be operated with the same discretion one would use with propeller craft, and this means that despite its nearly amphibious characteristics, it is not intended as an ocean going vessel.

In this special report on a new design, we have already stressed the elements of *safety* and have given the boat an excellent rating in that category.

Styling can be quickly dismissed with an average rating. The boat is clean-cut in appearance, rides the water gracefully, is neatly upholstered with durable weather-proofed material, and is equally as attractive in appearance as the general run-of-the-mill boat on the market.

The hull structure withstood all the beating we could give it in two days' time, and the pictures should bear testimony that we did not baby the outfit. Indiana Gear Works bought out Heckel Plastic Products Company, which had considerable experience fabricating fiberglass racing sailboats, C-Scows, Snipes, Y-Flyers, Thistles and Porpoises. I.G.W.'s Marine Division is continuing production of Heckel sailing craft, and Heckel's personnel, already experienced in fiberglass layup of racing sailboats, are supervising the construction of the jet-powered plastic hulls which are constructed of glass cloth, mat and woven roving. We visited the Turbocraft plastics plant and found that the hand lay-up procedures and the hull stiffening were all top quality. We gave the boat an excellent rating for *durability*, though we would like to see considerably more flotation material laid into the hull sides and foamed under the foredeck. As an added plus, however, we noted that not only the gell coat (that is the outside surface of the finished hull) contained pigment, but that pigmented resin was being used on the glass cloth and mat layers as well. The color impregnation in this boat is not just skin deep.

The Turbocraft moved to an above-average in *comfort* because of the forward cockpit seat which is coil spring suspended plus double action hydraulic shock absorbers to prevent oscillation. The ride is a soft one. The company is currently experimenting, too, with torsion bar elastic suspension which will also offer a soft ride. One or the other type suspension will be standard equipment in all models released.

Her *adaptability* is merely average, for this 16-foot has no particularly outstanding convertible features, nor would it serve comfortably as an overnighter because of the crowded aft cockpit.

It looks to me as though water jet propulsion of marine craft in the pleasure boating field has finally been produced in a practical and desirable format—even though it's taken 2200 years to develop. — ⚓

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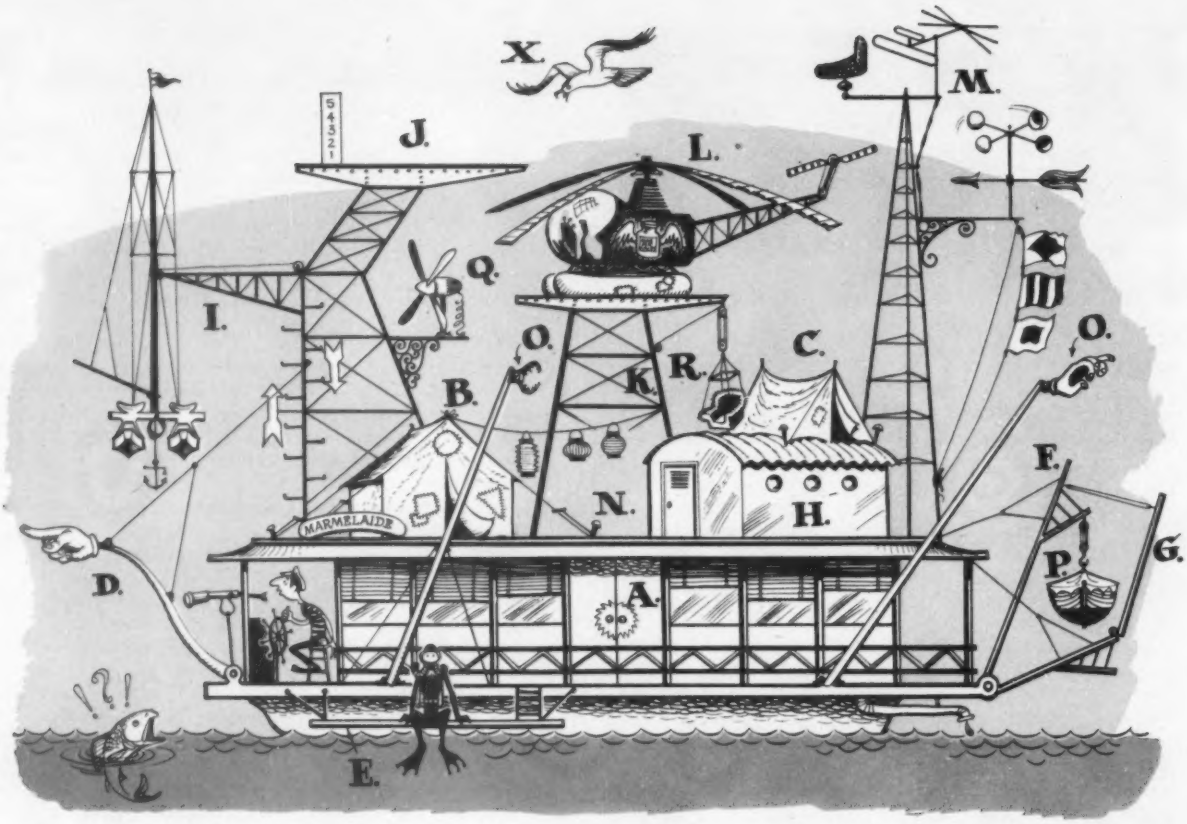


A sketch showed they couldn't have their cake and eat it afloat so this couple settled for . . .

MARMELAIDE

By Marjorie Jelsema

I'M A DREAMER. But aren't we all—especially where boats are concerned?

My dreams of the ultimate in a boat have finally jelled. After twenty-three years of rockin' n' rollin' and fumin' and frettin'-on rivers, oceans, lakes and streams in various boats of known and unknown pedigree—some of them real lemons too I might add—I've finally fallen for a nautical belle who has everything. As whistle bait she has no equal.

I'm so enthusiastic about this delectable charmer that nowadays my boating companions have a nautical way of referring to me, somewhat enviously, as Marjorie Hornblower. I just can't help blowin' my horn to let everyone know about this latest object of my affections. She's a real fourteen karat number.

Since 1957, when this fascinating coquette made her debut, she has been talked about and photographed many places in Florida—from the shimmering Gold Coast down through the Florida Keys—and on to Pirates Cove, her snug little home port on Key Largo.

Of all the various boats I've played nursemaid to, which in twenty-three years practically amounts to a flotilla, *Marmelaide* is the *crême de la crême*—all 25 by 45 feet of her, and I'll baby sit with her any day.

After being plunged into this fascinating and sometimes frustrating business of learning to be a captain's mate on many types of "pleasure craft," I'd like to recommend this little gem to all other mates who are wed to a boat-mad enthusiast. If she will put it at the head of her must-have list, it's bound to keep the galley slave gay, the old man of the sea happy, and the boat yards fit to be tied.

When plans began to jell for *Marmelaide* I began to recall with candor, and name in no uncertain terms, the inconveniences that this first mate had to contend with on our other boats, such as small, stuffy galleys, (nauseously referred to as gulleys by most gullible galley slaves), lack of head and sitting room and various other unmentionable inconveniences that I'd like to draw a charitable curtain across, if I may.

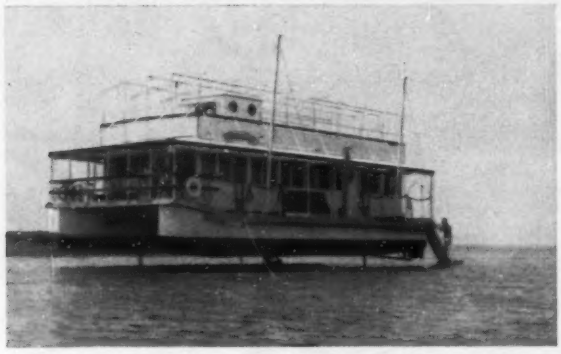
Last, but not least, I wanted a penthouse on the upper deck so that I could crawl inside and release all my pent up emotions. My penthouse, I'm happy to say, so far has not been used for this pu.pose. Temperament and emotions I still have, but now I also have plenty of room to blow off steam.

With tongue in cheek I also ventured to mention a helicopter for the upper deck, because once away from the dock Mel loses all track of time and invariably forgets what time of day or night it is. With a helicopter I figured I could just take off if I got tired of being a sitting duck.

Mel listened attentively, or pretended to, while I pointedly outlined my ideas of what this houseboat should have if he wanted a mate that would purr.

When I ran out of breath—and ideas, Mel looked as though he would like to sever the matrimonial ties he had somehow managed to get himself entangled in, but he quietly sat down at his drawing board and with great finesse drew out the reason why I couldn't have *all* the things I wanted on the boat. It would have taken a nincompoop to argue with the evidence on the finished page of his drawing. One look and all I could do was mumble a very weak "Aye, aye, Sir." Smug as a bug in a tug he then

Author's husband's conception of Marmelaide based on suggestions made prior to construction, left: A—main salon; B—tent for guests; C—tent for guests' guests; D—bridge finder; E—skin-diving platform, also landing stage; F—combination davit and gangway; G—gangway to gangway; H—aluminum house for air compressor for horns, whistles, calliope and siren; I—catamaran gantry; J—Sputnik launching platform; K—helicopter tower; L—helicopter dock hunter; M—weather tower, radio, TV and radar antennae; N—dance floor; O—mangrove grabbers; P—fishing boat; Q—wind generator; R—mink-lined bosun chair lift to helicopter; X—pet albatross. Items not shown include air conditioner, space heater; roof-top barbecue pit (behind guest tent), escalator to A Deck, home do-it-yourself blood pressure kit, and a deep freeze to be operated by hydrocosmic gasidulation. Finished boat, below, is shown raised on built-in stilts used when craft's bottom needs scraping or painting.



proceeded to the drawing board and came up with workable plans for our dream-boat. She's not the nightmare I dreamed up, but she's sure out of this world.

As any boat owner knows all work and no play makes jack—for a boat yard crew, and when you own one of these nautical pin ball machines, it usually takes not only plenty of jack, but also the help of Tom, Dick and Harry as well to pull the well-oiled skids from under you and make you feel like a pretty dull boy when presented with a yard bill.

Because we wanted to have our boat, and eat too, Mel diligently solved the boat yard dilemma by building into the two 5′ by 44′ steel hulls (which he also designed and built himself) four hydraulic jacks, which will raise our 23-ton boat four feet out of the water. With this setup we can do our own work on *Marmelaide*, and keep the barnacles off her bottoms.

Up in my penthouse, which goes up and down like a telescopic drinking cup, we have portable, hydraulic steering.

The frame for the awning, which covers the fiberglass-plastic upper deck, is also telescopic; raising from a height of 3½′ to 7′.

For the ultimate in Keys cruising *Marmelaide* boasts a unique set of mainstays that I call mangrove grabbers. As *Marmelaide* only draws 28″, we can pull alongside any mangroves or terra firma, drop the spiked grabbers, and feel that we are securely anchored.

When we want to get away from it all we just start the two 60 hp engines, located in the hulls, then snugly watch the shoreline disappear in the distance at 8 miles per.

MARMELAIDE continued on next page

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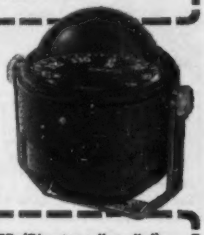

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The same in every detail as the No. 88 described above except dial is direct-reading type for a much wider range of visibility. Also **$15.00** Retail. **No. 88C**—The same as No. 88-B shown at left except it is internally redesigned for mounting in any convenient overhead location. Also illuminated. **$17.50** Retail. **No. 88SH**—For southern hemisphere. **$15.00** Retail

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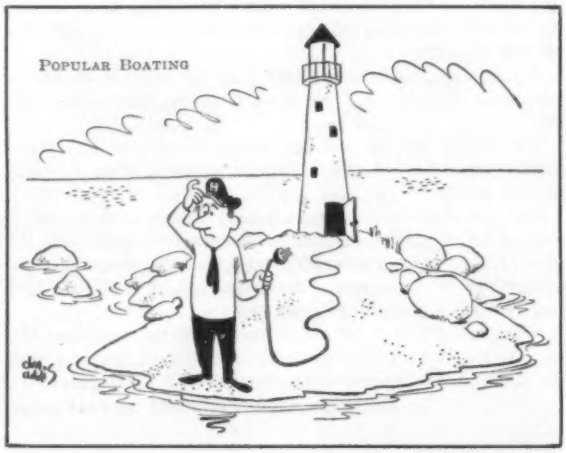
Captain Mel blows his horn—he has every right to do so as designer and builder of Marmelaide.

Now for the piece de resistance, which is enough to make any mate gloat. My dream boat boasts one hundred and fifty storage cabinets, an all-Formica kitchen, a living room 14' by 17'—with beamed ceilings and paneled walls; two large bedrooms and two complete baths. It's unbelievable that I can have all this headroom too.

With a canoe on the upper deck of *Marmelaide*, a 16' fiberglass dingy (equipped with an 18 hp motor) swinging from davits on the stern, the Skidaddle—a real hepcat—swinging from davits on the starboard side, we swing and sway down the bay. And is this mate happy? I'll say!

Oh, for the life of a sailor! Man, I've really had it, I got it, and I intend to keep it—come hull or high water.

Marmelaide is not only a wonderful life preserver she's also a sweet jam to be in.— ⚓



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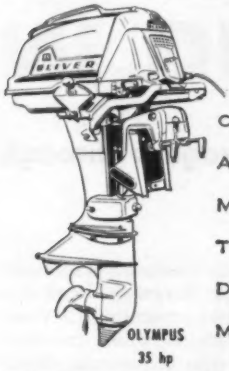

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OUTBOARDING IN

This 300-mile exploration around Cook Inlet led voyagers through

By Jim Reardon

NOW THAT ALASKA has been granted statehood, thousands of Americans are wondering what the 49th state is like.

Well, it's exactly like it was as a Territory, with a different political set-up. A poor answer, perhaps, but a way of pointing out that because of political changes, the land hasn't changed. And it isn't likely to change for a long time either, at least from the standpoint of water and mountains and forests and glaciers, and all the other magnificent wilderness attributes found in such profusion in this great land—which is the Indian meaning of the word Alaska.

Sheer mountains, rising straight from the water's edge, great grass-lands, huge marshes, vast conifer forests—all wilderness—spread from Alaska's waterways, across the thinnest populated land under the American flag. Alaska's present population is estimated at about 250,000—only about two and a half times the number of persons who can crowd into the Rose Bowl, at Pasadena, California.

A man could spend a lifetime doing nothing but poking into the almost countless bays and inlets, and exploring rivers and lakes along Alaska's shore, and he would just scratch the surface. The best a person can do is to choose one area and enjoy it to the fullest.

That's just what C. A. (Bud) Weberg and I did last June when we cruised around Cook Inlet in my 21-foot skiff.

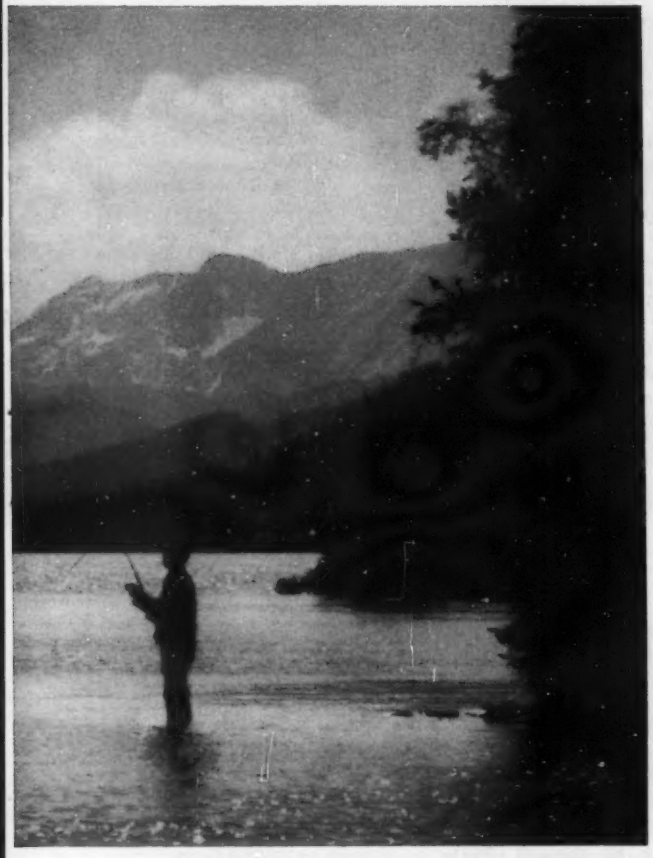
Bud and I live at Homer, which fronts on Kachemak Bay at the tip of the famous Kenai Peninsula. Bud is a fisheries biologist for the Alaska Department of Fish and Game and I am a big game guide, photographer, and free-lance writer. Bud wanted to talk with commercial fishermen who take salmon in Cook Inlet, and I wanted to scout for new hunting country. We decided that we could make the trip we wanted, if we were careful, in my open skiff, using outboard power.

Cook Inlet is about 50 miles wide at its mouth, and 150 miles long. It was named for Captain James Cook who discovered it while searching for a northwest passage in 1778. Tides in the Inlet are the second highest on earth, and tidal currents in some places have been estimated at "more than 8 knots," according to the *United States Coast Pilot 9*.

It was bright and sunny when we left Homer, at low tide, planning to ride the incoming tide up the Inlet. We used a 30-horse Evinrude, and had with us a 7½-horse Evinrude as spare. Our speed, loaded, we estimated at about seven miles an hour.

For the first hour we fought a heavy chop and had to throttle down. I was at the motor and spray drenched me thoroughly. Bud crawled half under the decked-over bow and grinned at me every time I was sprayed.

In an hour we rounded Bluff Point at the mouth of



Lakes abound in Alaska, and most of them can be fished. Many are connected by streams and are accessible by boat. This wilderness lake at left is on Kenai Peninsula. Author's trip around Cook Inlet is shown on chart, below.

ALASKA

an unspoiled wilderness

Kachemak Bay and left the chop behind. The sea was glassy, there was no wind, and with the tide running with us, our shore speed was about ten miles an hour. A whale surfaced 50 yards ahead, blew hoarsely, and slowly rolled under again.

The tide changed at mid-afternoon and our shore speed quickly dropped to about three to four miles an hour. We continued up the Inlet, but we had to fight tide rips and the swift current until around eight that evening, when we reached the beach camp of Larry Clendenon, a fisherman friend, where we stayed the night.

The tide went out, of course, leaving our skiff high and dry. It was much too heavy to move by hand, so it stayed there until noon the next day, when it re-floated, and we headed on up the Inlet.

We went into the town of Kenai, located on the swift and wide Kenai River, arriving there about three p.m., hoping to get some gas. We managed to get two cases (20 gallons) and as we were loading it, getting ready to leave, Jack Lewis, a bush pilot, happened by.

"Where'd you come from?" he wanted to know.

"Homer!" he exploded at our answer. "In that thing?" looking at the skiff. "And you're planning to cross the Inlet in it? You're crazy!"

My confidence was slightly shaken when we left with

ALASKA continued on next page

Cold wind, a choppy sea, and spray over the bow combine to force Bud Weberg, author's companion to don raingear. Open sea travel in an outboard was not always pleasant on 300-mile Cook Inlet trip.

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Jack standing there still shaking his head. He had a flight planned across the Inlet in a day or so and he promised he would look around for us to see if we were still afloat.

We planned to cross the Inlet at the safest place and at the safest time. Between the East Foreland and West Foreland—peninsulas of land that jut into the Inlet only 10 miles apart—seemed the best spot to us because we would never be too far from land. But the *Coast Pilot* estimates tides between the Forelands at 8 knots or more. Bud had seen from the air bad tide rips there. So the only safe time to cross was at high or low slack, which is what we did—high slack.

It took us about an hour and a half to run between the Forelands, and the water was glassy and calm all the way. Just as we neared the other side the tide started to run out, and strong swirls tugged the bow this way and that for a

Bud bails skiff after it is left high on mudbank as tide goes out. Cabin is for guard who polices stream against illegal fishing during salmon season.

time, and we could see tide rips forming as the current gathered force. But we were gone when the tide started running fast.

That night we spent in a U. S. Fish and Wildlife Service stream guard cabin we had been offered the use of. Just before we arrived there, as we followed the map, we saw a herd of about 50 hair seals on the beach. They abruptly splashed into the water as we neared, for they are accustomed to being shot at by almost every boat that nears them. A $3 bounty is paid for each seal killed, for they do eat salmon.

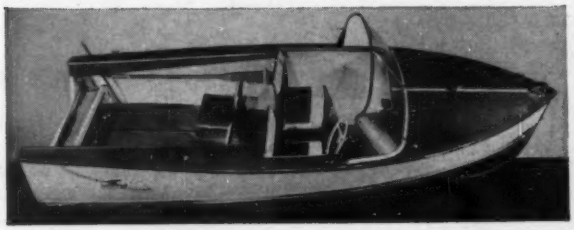
A fishing boat, the *Alinchek*, was anchored near the mouth of the shallow slough we had to go up in order to reach the cabin. Bob Ducker and his wife Carmen were aboard. We stopped to chat for a moment, and discovered they had a pet baby seal aboard. They had caught it in their salmon net the previous day. Another seal, dead, hung over the side.

It rained that night, and we were thankful for the dry cabin. We lingered there until afternoon of the next day when the clouds lifted slightly and the steady rain diminished. When we left we idled downriver toward the Inlet again. We were low on gas, and wanted more before we headed for Snug Harbor, about 50 miles south of us.

We talked to the Duckers, and Bob radioed a cannery tender, the *Tyonek*, asking if they were going to pick up his fish, and if so, where. The *Tyonek* replied that they would be off the mouth of the slough in a couple of hours, and yes, we could get gas from them.

The Duckers lifted anchor and went out to make one more set for the day—it was high tide and time for fish to be moving. We cruised up and down the nearby shore, hunting seals. We fired perhaps a dozen shots with a .30-06 at bobbing heads, and hit one. But the animal sank before

ALASKA continued on page 62



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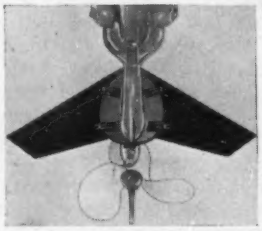

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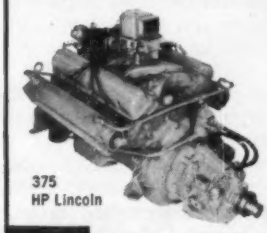

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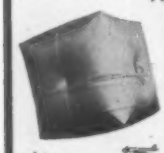

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we could reach it and cut off the scalp which has to be turned in for the bounty.

A white speck grew out of the distance as the *Tyonek* approached. We went out to meet her, pulling alongside for fuel as soon as she anchored. As we filled the dozen five-gallon cans aboard the skiff a small plane dived out of the sky and skimmed by, waggling its wings. It turned and swooped close by again. This time Bud and I recognized Jack Lewis, the Kenai bush pilot who had promised to check on us. Jack waved the wings again and continued on his way.

After refueling we headed south, hoping to find a stream we could pull into for the night. We had a small tent and could be quite comfortable on the beach.

But the clouds settled again, and wisps of fog drifted across the water. The area we were crossing was a vast mud flat that extended two or more miles from shore, and even at high tide it gave but a few feet of water under our hull. We followed the map and used our binoculars to locate Drift River, or the Katnu River. Both looked large enough on the map for us to enter.

We never did see the Katnu. When we located Drift River the tide was about half out and it was so shallow at the broad delta at its mouth that we couldn't approach within half a mile of the beach.

We turned back into the Inlet and continued south, searching for a place to land. The black clouds overhead, an occasional spit of rain, and night coming along this strange coast all presented a dreary prospect.

Finally at 11 p.m. we pulled in close to shore where the water was a couple of feet deep and put the anchor out with 100 feet of line. We lit the gasoline camp stove and had hot coffee and beef stew.

Rain fell steadily, but the sea remained calm as the tide started in. Because of the clouds it was dark and it would have been dangerous to travel farther. We draped a tarp over us, and I crawled up under the bow where it was dry and sheltered if not warm, while Bud reclined on the floorboards behind me and under the tarp. We dozed.

It was bright daylight, with high fast-moving scattered clouds at 2:00 a.m. when we awoke. A brisk north wind was creating a nasty chop that rocked the boat violently. Waves were breaking all around us. It looked as if it could get worse.

We pulled anchor and started south, heading toward 25-mile distant Tuxedni Bay and Snug Harbor. That was the first shelter to the south indicated on our map.

The sea was dark and ugly that morning, heaving irregularly with a light wind behind us. We passed several beach camps, where fishermen probably turned in their sleep, wondering who was silly enough to be out in a skiff that time of night.

The wind increased as we reached shelter. The calm water of Tuxedni Bay and adjoining Snug Harbor was one of the most welcome sights of the trip.

But within minutes of the time we beached the skiff on Chisik Island a real old-fashioned Alaskan williwaw was on us. These freak and violent winds are caused when air dams up in great quantity on the windward side of a mountain and spills over suddenly as an overwhelming surge.

We lit the stove and made coffee. But wind whipped it from our cups as we stood trying to drink it. Green leaves filled the air as they were flailed from the alders and cottonwood trees, and fluttered down to carpet the beach. Wet mud flats had clouds of water lashed from their surfaces.

We staggered about in the violent wind for a time and finally found an abandoned lean-to, covered with tarpaper, and unrolled our sleeping bags in it and tried to make up for sleep we had lost the previous night.

ALASKA continued on page 64

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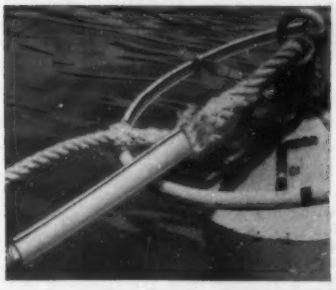

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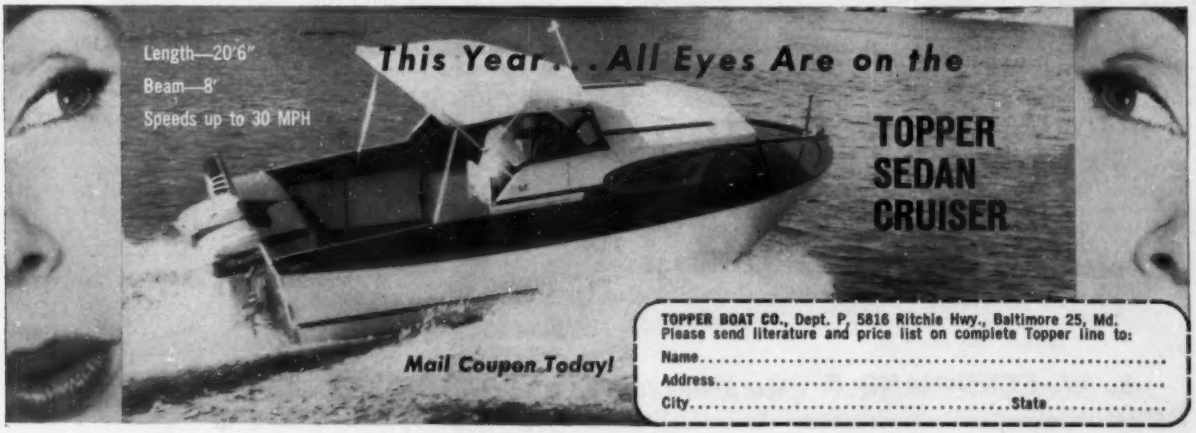

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The wind continued. It would be perfectly calm for a few moments, then suddenly a terrific gust would slam us. Within a few minutes the tarpaper was torn completely from the shack and whisked from sight. Rain came with the winds, and soon water was dribbling on both of us and our sleeping bags.

The walls of the lean-to were of 1 x 8 lumber. I lay close to the windward side, and the walls actually bowed inward several inches at each gust. The tide was out, leaving the skiff aground, so we didn't worry about it.

The wind died by three that afternoon but a steady rain fell. We had to get a couple of small tarpaulins from the skiff to cover the roof of the lean-to. While we were at it we unloaded the skiff of all our food and most of our other gear and decided to stay for a time.

For several days we poked around Tuxedni Bay. At the head of it we found one of the most scenic spots I've ever seen. A huge glacier poured down to the stream feeding the bay. The towering snow-capped fog-shrouded mountains stood majestically above the spruce islands, rocky coves, and grassy beaches of the blue-green bay.

For two mornings, at low tide, we saw herds of 30 to 50 seals sleeping on the mud across the bay. The noise of their barking and the soft hooting of the pups carried to us clearly. The third morning we left the skiff on the mud where we could skid it into the water. One shove and we had to leap aboard the careening boat—and we whizzed a good hundred yards on the gently sloping mud at a speed faster than we could have run. Spray flew high when we hit the water. We intended to speed across the bay and shoot some of the seals.

With the motor wide open the empty skiff planed well, and we headed directly at the largest bunch of seals. When we were about 200 yards away the animals started splashing into the water, and by the time we were within reasonable range for shooting from the speeding boat all were in the water and submerged. I have never seen 50 large animals disappear so quickly.

They started reappearing in the water, and the pups cried as they were separated from their mothers. Often mothers and pups surfaced together, the pups riding the mothers' backs. I looked at them and lost my desire to shoot.

Next day we headed down the coast, headed for 25-mile-distant Chinitna Bay. Before we left Snug Harbor we pulled up to the cannery dock and refueled. We also stopped at the *Lady Jean*, a Homer boat operated by my friend Carl Jones. When we told Carl we were going to Chinitna he warned, "Watch the bears there. If you shoot one, remember they don't know when they're dead." Carl spent a summer season at Chinitna with a string of horses, helping to work on a road built from the bay to the top of a distant ridge where an oil well was sunk.

The run to Chinitna was uneventful. We hit a few places where wind pouring off glaciers onto the Inlet was capping waves over, and we ran through a few rough tide rips. But we were running with the tide and made good time. It took us three hours to make the 25 miles.

Our trip lasted 10 days, and we covered approximately 300 miles in the open skiff during that time. I won't say that an open boat is ideal for such a trip, because it isn't. But I do believe that outboard power has the advantage for a cruise similar to ours. One of the new beamy and seaworthy outboard cruisers would have been perfect for our purpose. Some shelter on a boat is needed for travel on open sea this far north, where it can get quite cool even in summer.

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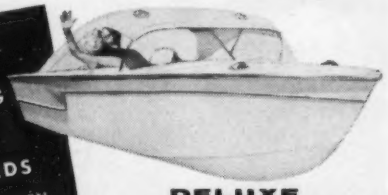

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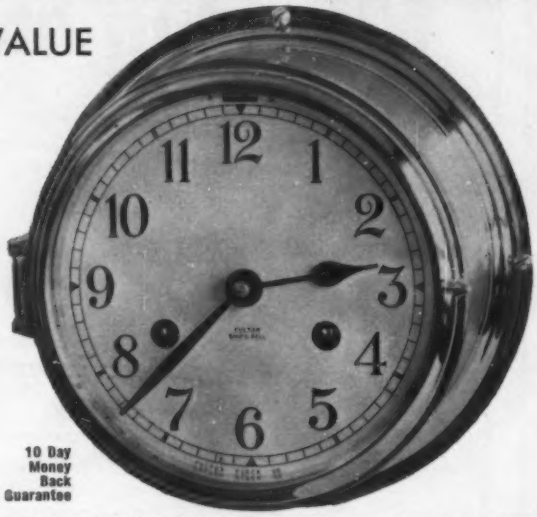

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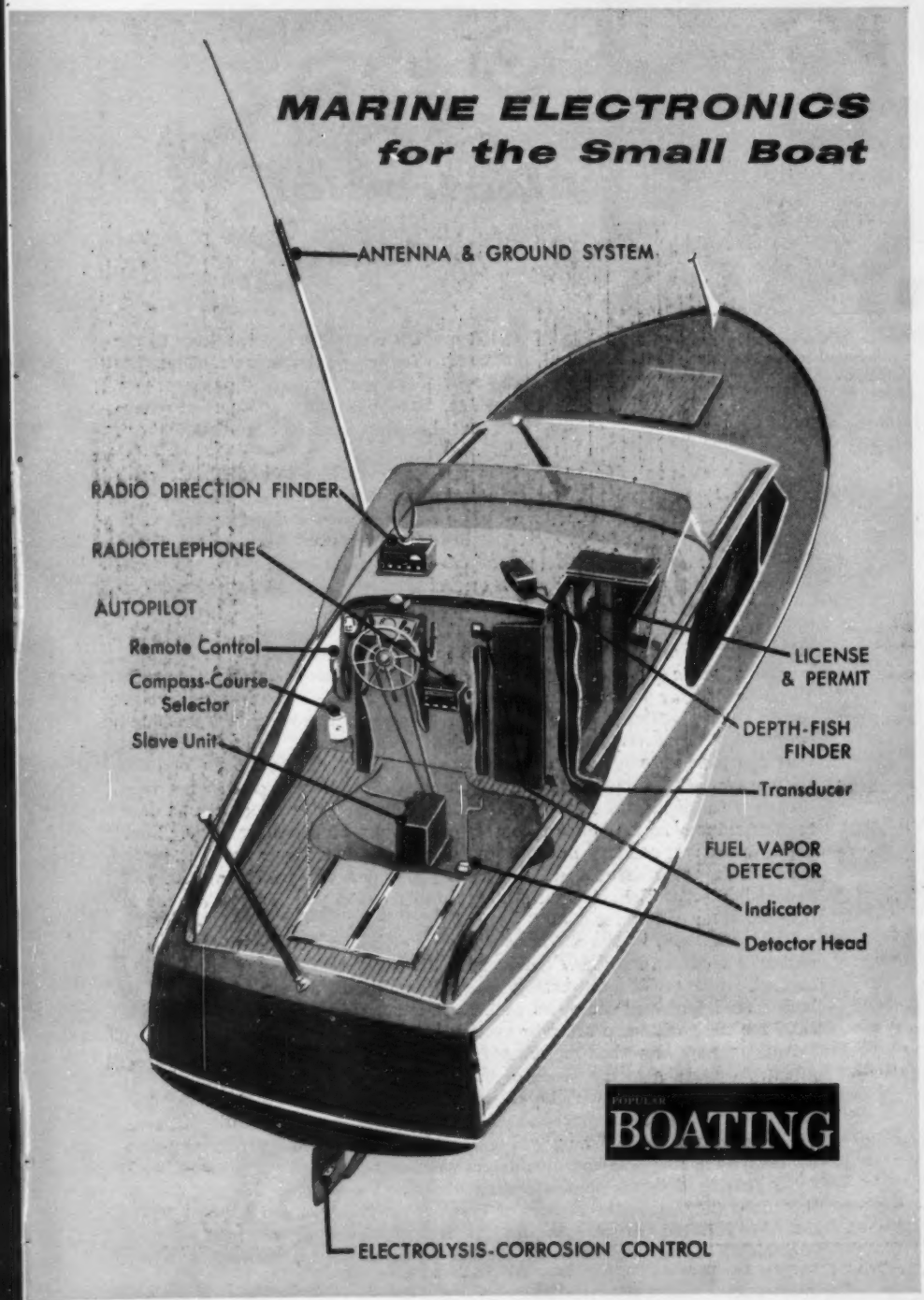
MARINE ELECTRONICS
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ELECTROLYSIS-CORROSION CONTROL

Topics for this special marine section being discussed by Wm. McKeown, Editor of POPULAR BOATING, and Oliver Read, Editor of POPULAR ELECTRONICS.

Electronics Afloat

OUR modern electronic age is taking to the water. Today's boatman can multiply the pleasures of his sport with new products now available. Safety, comfort, and ease of operation are benefits electronic accessories can bring.

Every boat is suitable—no craft is now too small. The 6- and 12-volt automotive batteries used to start outboard motors can power a radiotelephone and depth sounder as well. Newest large outboards now include generators to keep your battery at full power. The boating family that ties up at dockside berths serviced with electric lines may use heavy-duty cooking and refrigeration conveniences, while offshore a converter can change battery current to voltage needed for even a TV set and similar luxuries.

Safety, however, should come first for the boatman, and it is here that electronics is now making a major contribution. The best method of handling trouble at sea is to avoid it, and the skipper who can always determine exactly where he is may then plot his course to avoid shoals and rocks under the water, strong currents on the surface, and storm squalls which are predicted overhead. The portable rudio that gives weather reports, the refined model that can pick up long-wave aircraft forecast data every half hour, and the short-wave set that monitors reports from the Coast Guard and other boatmen —each of these adds to security afloat. The radio direction finder can be used to determine position, plot a course, or "home" on shore stations. Your depth finder will not only indicate sufficient water under your keel but, when used with a government chart, will show you where you are during times of bad visibility. And should you still get into trouble, your radiotelephone is invaluable for calling for help.

Electronics also makes the operation of your boat much easier today. The outboard boatman may now move about his boat, steering it with a remote control, while the inboard cruiser skipper can install an automatic pilot to hold a predetermined course as well. Even small radar sets designed specifically for the yachtsman are now available.

And since pleasure boating is for fun, comfort is important for the family afloat. In addition to the peace of mind which electronic aids to navigation can bring, they also offer radio entertainment, predictions of where the best weather will be, power megaphones to communicate with friends, and even indications as to when fishing will be best—by helping the boatman to locate his favorite fishing hole and then detect whether or not fish are present.

To provide a better understanding of marine electronic devices, and to show how they work, the Editors of POPULAR ELECTRONICS and POPULAR BOATING have selected the following feature articles which we hope will serve to educate the layman and to widen the knowledge of the experienced boatman.

Radiotelephones for Small Boats

By
B. H. BALLARD, JR.

Modern outboards with electrical systems can take advantage of the new small radiotelephones, like the Apelco unit above, which are simple to install and operate.

MARINE radiotelephone service for small craft was started years ago to provide boat owners with a method of communication other than hand waving, horn signals, flags or lights. Now, radiotelephones are used by thousands of boating enthusiasts everywhere.

All outboard motor manufacturers offer versions of their larger engines with starter batteries and generators, and this makes it possible to use a variety of 12-volt operated "extras." Two-way radio is one of them.

Coast Guard Contact. Safety is the most important reason for putting a two-way radio on your boat, regardless of size. After all, small boats are more easily affected by foul weather than larger boats.

A radio-equipped outboard can call the U. S. Coast Guard for help, if necessary, on the international "Calling and Distress" frequency of 2182 kilocycles. Distress calls have top priority and the law states that all boats must clear the 2182-kc. channel immediately if a distress signal is heard. Just knowing you can call the Coast Guard for help if you need it will add a lot to your boating pleasure.

Boat-to-Boat Contact. Two channels have been set aside by the Federal Communications Commission for talking from one boat to another. You can use these frequencies for keeping track of boat locations during a group cruise, relaying information about an intended stop, checking weather ahead or, for that matter, calling to another boat to find out where the fish are biting! Outboarders on the inland rivers can also use their two-way radios for contacting lock operators about lock operation schedules.

Because the number of channels set aside

for boat-to-boat contact is limited, the FCC requires that conversations on these frequencies be confined to the business of the boat. In other words, the channels should not be used for general "gossiping."

Marine Operator Calls. Several telephone companies, including the Bell System, maintain radio stations at many locations on the coast line, Great Lakes and larger rivers. Through the Marine Operator at each of these stations, it is possible to call any land telephone from your boat.

To use the service, all you have to do is open an account with the shore station in your area just as you did for the telephone in your home. However, there is no monthly service charge since calls are billed to you on an individual basis. Average cost is about $1.25 per call plus the regular toll charges from the shore station to the telephone being called.

Marine Frequencies. A good idea of what frequencies are available for marine communications and their relation to the regular broadcast and short-wave bands can be had by referring to the drawing on page 71. Ship radiotelephone systems operate at radio frequencies below the standard AM broadcast band as well as at medium frequencies above it.

Several frequencies in the 2 - 3 megacycle (medium-frequency) band between 1600 and 2850 kc. are available to small commercial vessels and pleasure craft for radiotelephone operation. This is the band which is most used by small-boat owners. Specific frequencies (channels) in this band are assigned for ship-to-ship radiotelephone communications. Communications is permitted between all ships licensed and equipped for operation in this band.

In making a distress call on 2182 kc., you should repeat the international distress signal, "MAYDAY," three times, following which you should state the name of your boat, location and nature of your trouble. Keep calling at short intervals until you get an answer.

Choosing a Radiotelephone. The simplest types of marine two-way radiotelephones for outboards and small craft cost about $250 for a 20-watt, 3-channel model, and $300 for a 30-watt, 5-channel unit. Usually the price includes antenna, antenna mounts and crystals for at least two channels. More elaborate or higher power units are proportionately more expensive. Quality, features and performance should be carefully considered, as well as the price. Use these pointers as a guide:

- Up-to-date lower powered units are partially transistorized to reduce battery drain. However, don't look for an "all-transistor" radiotelephone of high power. Good radiotelephone performance is had from a combination of transistors and vacuum tubes.
- Even though you may not be very technically-minded, you can still recognize quality construction when you see it. For example, check the material used in the outside case of the radio. If it is metal, you are assured of maximum shielding. Nonferrous covers (like Fiberglas), may seem to be adequate, but they will give you no electrical shielding from motor ignition noise.
- The well-designed two-way set will have an automatic noise limiter and antenna trimmer control. Both are necessary for efficient operation of the equipment under all conditions.
- Does the radio have tube clamps? It should if it's going to stand up under the pounding it will get in the average outboard. Ask your dealer to show you the inside of the set as well as the outside!
- Some radiotelephones use self-contained batteries. It may be true that you can listen to the radio "on the beach" if it has a dry battery in it; but will it give you the necessary volume when your boat is underway? Your best bet is to skip the dry batteries and choose a set that receives its power from the boat's 12-volt starter battery.
- Look at the antenna. The higher the antenna loading coil is above water, the better the signal strength will be.

Communication Range. The range of ship-to-shore or ship-to-ship communications depends upon a number of factors. The most important ones are: transmitter power, operating frequency, location, atmospheric conditions, time of day and year, and the efficiency of the antenna system (see the article entitled "Small Boat Antenna Systems" on page 75).

In the 2-3 mc. band, communications range can be figured by a rule-of-thumb as approximately one mile per watt of transmitter power input. Thus, a 30-watt transmitter gives a 30-mile range and a 100-watt transmitter a 100-mile range. Above 100 watts, doubling the input power adds only

25 to 30% to the range over sea water. Increasing the power ten times increases the range only three times.

Man-made noise and natural static have a severe effect on range by lowering the intelligibility of speech. In such cases, higher transmitter power can sometimes push through the noise.

Noise and Interference. Noise can be natural atmospheric static, such as thunderstorms, or it can be caused by the ignition system of the vessel or other sources of man-made interference. Noise exists most of the time, but varies widely in intensity.

A strong radio signal practically eliminates noise in a set equipped with a.v.c. (automatic volume control). The a.v.c. reduces the sensitivity of a receiver when a strong signal appears, and increases it as the signal weakens or disappears. In effect, a strong signal overrides the noise.

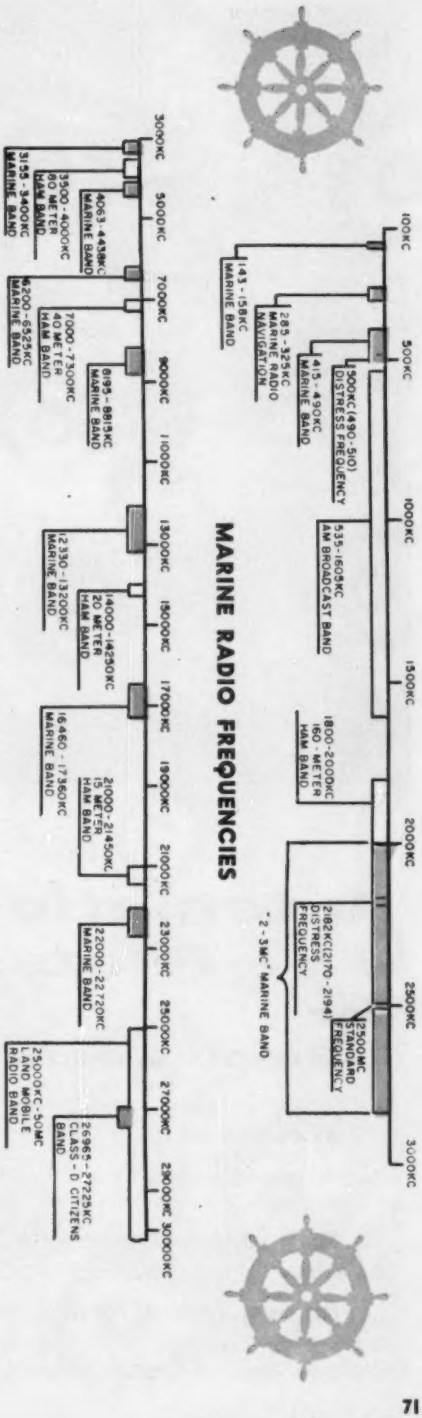
Many receivers have squelch circuits which cut out background noise when no signal is being received. Some have noise limiter circuits which reduce or eliminate noise pulses.

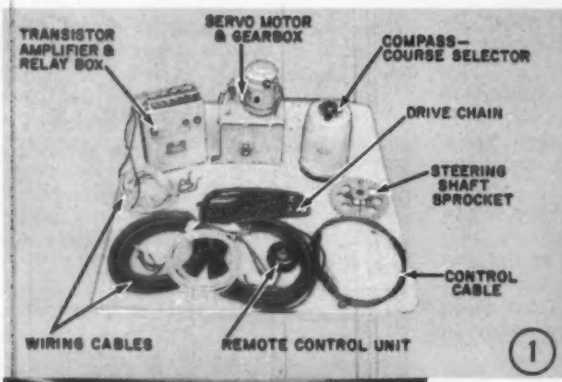
You Need a License. Boats equipped with two-way radios must obtain a station license from the FCC, which also shows the boat's "call letters." Besides this, the radiotelephone operator must have a "Restricted Radiotelephone Operator Permit."

But don't let these requirements worry you! There are no examinations to take and the procedure is more like a registration than anything else. Let your dealer help you with the FCC forms and marine telephone service applications.

One other thing: after a two-way radio has been installed in a boat, federal law requires that an individual holding at least a 2nd Class FCC License must first put the station on the air and certify that the equipment meets prescribed frequency and modulation requirements. Here again, the dealer selling you the radio can take care of this for you—be sure he makes the entry in your logbook.

Keep in mind that the radiotelephone is primarily a safety device, and should be used only to further the safety or efficiency of your boat. Idle talk unnecessarily ties up channel space which others may urgently need, besides being against the FCC regulations. Enjoy your radiotelephone—but use it well.





Sperry

Automatic Pilots for Small Boats

By OLIVER READ
Editor & Publisher
POPULAR ELECTRONICS

They save fuel, eliminate fatigue, reduce running time, and give added safety

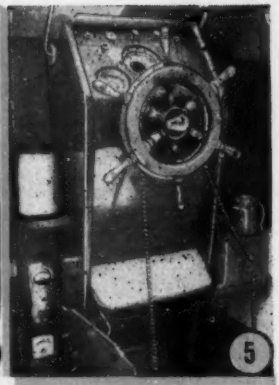
AUTOMATIC STEERING has long been used on ocean liners for purposes of safety and economy. Today, the smaller boat, too, can have a compact autopilot installed, and at a relatively low price. An automatic pilot is, in effect, like having another hand on board. This means that the limited crew of smaller boats has a chance for relaxation and thus can avoid making the navigational errors to which overtired skippers are prone.

In times of bad weather, an autopilot allows the helmsman to leave the wheel at any time to secure loose gear, lay new courses, or handle any emergency that may arise.

A properly adjusted autopilot steers a much straighter course than can any helmsman. More accurate courses mean real savings in fuel consumption and running time. Where time and fuel costs are high, an autopilot is an excellent investment.

Principle of Operation. The principle of the autopilot is not complicated. The unit which senses the heading of the boat is basically a gimballed magnetic compass. As the compass rotates, a beam (or beams) of light passes through slits in the compass card and falls on one or two photocells. When the boat deviates from its course, the compass card turns, allowing more or less light to fall on the photocells.

Since the photocell is sensitive to light variations, it creates a corresponding change in electrical current. This small change of current is then amplified by



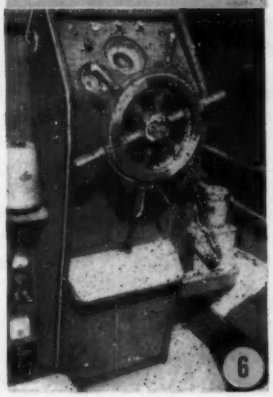
1 The major components of an automatic pilot are shown arranged on a hatch cover before installation on the author's Trojan cruiser. This unit, by Wilfrid O. White & Sons, Inc., Boston, includes a hand-size remote steering control with a 25-foot cable.

2 Compass-course selector unit is shown mounted near the wheel on a specially built bracket. It should be located at least 30 inches away from the ship's compass and other magnetic materials. Small knob at top selects desired heading for vessel.

3 Motor and gear unit is also mounted on special bracket, with sprocket parallel to wheelshaft sprocket. Bracket on top of unit is for clutch control shaft to engage or disengage autopilot.

4 Split sprocket fits over wheelshaft, should be in same plane as gear-box sprocket. Size of wheel sprocket is determined by steering ratio of wheel to rudder and by desired cruising speed.

5 Chain is draped over both sprockets, then cut to size and riveted closed. The box at the bottom of the wheel housing holds a 45-volt "B" battery which powers the amplifier and relays. The ship's regular battery powers the steering motor.



6 Completed installation shows chain closed and taut between both sprockets. Chain is kept tight by adjusting the mounting of the motor gear-box unit. Any backlash will result in erratic steering.

transistors or tubes to the point where it can actuate a relay which controls the electric motor in the steering unit. Then the steering unit gives right or left rudder to bring the vessel back on its proper course.

Remote Control. An automatic pilot with control available only at the helm position would leave much to be desired, since the operator would have to stay near the helm a good part of the time if he wanted to dodge floating objects or make temporary course changes. However, most autopilots include a hand-held remote control unit connected to the automatic steering unit by a long cable.

The skipper can take the remote control unit with him up forward or to the stern and know that if any emergency should arise, such as dodging a buoy, he can override the autopilot and change course by the flick of a switch. By flicking the switch back, he can return control to the autopilot and bring the boat back to its original heading.

Installing an Autopilot. Since the compass and binnacle unit is basically a magnetic compass, it is affected by nearby

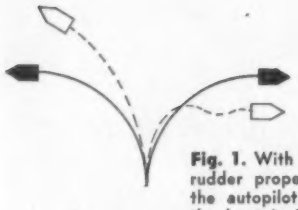


Fig. 1. With left and right rudder properly equalized, the autopilot should move the boat in identical turns to the left or to the right. Dotted lines show the effect of unequal rudder control.

metals and magnetic materials. This means that it will affect the regular ship's compass, and vice versa, so that new deviation tables will have to be made, both for the autopilot compass and for the ship's compass.

Considerable magnetic fields are also generated by the motor and gear-box as well as by the relay box and the magnets inside the relays. This means that the compass-binnacle unit should be at least thirty inches away from any other compass, although convenient to the steering wheel, and far enough away from magnetic and mechanical devices such as windshield wipers, remote control devices, etc. Careless installation can cause the compass card to move sluggishly on some courses, and too rapidly on others, resulting in erratic steering.

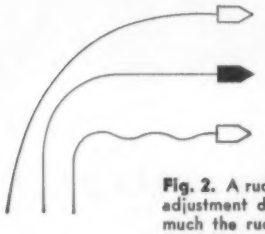


Fig. 2. A rudder amplitude adjustment determines how much the rudder will react to a change in course. Top wake shows too small a rudder angle, turn is too slow. Bottom wake shows too great a rudder angle, resulting in over-steering and a fishtail effect. Middle wake shows correct adjustment.

The amplifier-relay unit should be mounted in a dry, cool, and ventilated place so as to minimize the effects of moisture on the delicate relays and components. It should be at least three feet from the compass unit as the relays are magnetic and create a disturbing field.

The gear-box should always be kept filled with oil. In securing the chain between the wheelshaft sprocket and the gear-box sprocket, make sure that the two sprockets are parallel (in the same plane) and that the chain is taut. Any backlash in the chain will result in loose steering and poor functioning of the autopilot. To avoid this, the motor gear-box unit should be mounted with adjustable bolts which can be tightened or loosened as required.

Limit switches are connected to the gear-box shaft and preset at the factory to shut off the motor after a certain number of turns, usually representing about 60° (total) rudder travel.

Adjustment. Since every boat handles and steers differently, two simple types of adjustment are usually necessary to make the autopilot function properly: left and right rudder equalization; and rudder amplitude adjustment. Left and right rudder equalization means merely that the autopilot will move the rudder the same number of degrees to the left as to the right for a given change in course to the left or right. (See Fig. 1.)

Most important is the rudder amplitude control, which determines how great the rudder angle to either side will be when course is changed. Too great a rudder angle will give a fishtailing effect to the boat because the autopilot will oversteer for small changes in course. Too small a rudder angle will give a slow and sluggish response to rapid course changes and leave the boat to the mercy of wind, wave, and tide. (See Fig. 2.)

Of course, the correct rudder amplitude (or the amount of steering) depends on the speed of the boat, and the rudder amplitude control should be adjusted for normal cruising speed. Once set, it will usually function efficiently six or seven knots faster or slower than cruising speed. At very low speeds or at planing speeds, however, the autopilot should not be used, or it should be readjusted accordingly (if this can be done).

Keep in mind that an automatic pilot should not be used in harbors or congested areas—it's strictly an open-water cruising device. Chances are that once you've used an autopilot for extended cruising or fishing, you won't understand how you ever managed without one.

Small Boat Antenna Systems

You can double your signal strength with an efficient antenna system

THERE ARE two ways of pushing a signal out beyond the horizon. One is to have plenty of power—but boat-transmitter power is limited by the capacity of the boat's battery and the owner's pocket lining. The other way is to have the best possible antenna system. This does not necessarily cost a lot of money, but it does require careful planning, workmanship, and materials.

Power Leaks and Efficiency. Maximum efficiency in radio transmission is achieved when all the transmitter output power is radiated, i.e., turned into radio waves. Two conditions are necessary for maximum efficiency: the transmitter output impedance must match the antenna impedance, and the antenna impedance should consist only of the radiation resistance, which makes radio signals.

The first requirement is easy to meet—properly tuned marine radiotelephone out-

By
ELBERT ROBBERSON

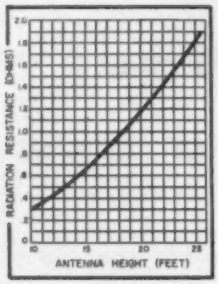


Fig. 1. Radiation resistance of Marconi antennas having heights that vary from 10 to 26 feet.

put circuits are designed to match any normal antenna impedance found on a small boat. But here is the egg in the fan: the small boat antenna system harbors many resistances other than radiation resistance.

Starting with the output terminals on the transmitter, precious watts are dissipated right and left. For example, there is dielectric loss due to leaky insulation (very common, once insulation is hit with salt water or spray), absorption in nearby metals and conductive materials, antenna "loading-coil" resistance, the ohmic and skin effect resistance of antenna system wire, and—most important—resistance of the ground connection.

Antenna height (the length of the radiating portion, not the height above ground) determines how much loss resistance you can afford. Figure 1 shows how antenna height determines radiation resistance, that is, the resistance of the antenna which actually radiates power. The ratio of the radiation resistance to the loss resistance determines the proportion of transmitter power which is actually converted into radio signals.

Consequently, a major consideration in choosing an antenna is to select the tallest one that is practical for your boat to carry.

Antenna and Loading Coil. Marine antennas are different from other types of antennas for good reason. Need for mechanical strength, corrosion resistance, adequate mountings, and special electrical characteristics has resulted in a highly specialized breed, developed through many years of experience in boat installations. The basic design is a rod or tube of lightweight weatherproof material, such as heavily protected aluminum, or a plastic tube with a molded-in conductor, from 12 feet in length on up to the maximum size practical for a small boat.

Somewhere in the antenna, near the top, center, or bottom, there is a loading coil to increase the electrical length and to help in resonating the system. Loss resistance in the loading coil is easy to come by. In early antennas, consisting of a wooden pole wrapped with wire, coil resistances of dry antennas have been measured from 5 to 15 ohms—but, after one dash of rain water, this could jump to 25 to 50 or more ohms.

A good way to judge antennas is to mosey around the boatyards, examining the ones that have seen service. You can assume that like-sized products of experienced manufacturers start about even in effectiveness. But a little exposure to the elements will soon cut into the efficiency of those antennas which are less resistant to flexing, vibration, sun, and spray. When water gets into coils, when connections corrode, plastic begins to crack, and insulators become weather-beaten—your antenna is shot, no matter how effective it was at first. Try to get one which retains its desirable properties the longest.

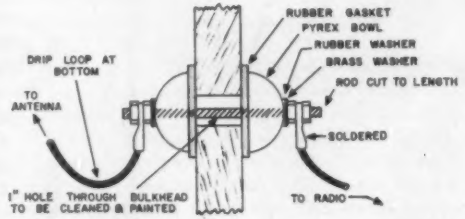


Fig. 2. Technique for running antenna lead-in wires through deck or bulkheads. All connections should have large surface areas. No. 10 copper wire or larger should be used, or ¼" copper tubing.

Lead-In and Wiring. It was popular at one time to use automobile ignition cable for the antenna lead-in because of its superior insulation. But some ignition wire has stainless-steel conductors, and since stainless steel has a high resistance (in comparison with copper), the use of such wire can make 40 watts sound like 10 watts

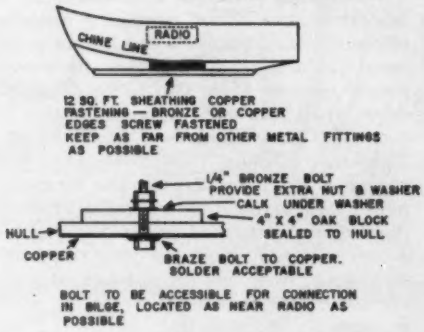
on the air. Even if the conductor is copper, however, the gauge is too small for best efficiency.

The old Navy-style lead-in, ¼" copper tubing mounted on stand-off insulators, is efficient if there is room for it. Or, instead of copper tubing, insulated No. 10 wire can be used. Never paint over lead-in wires—metallic pigment in the paint causes losses.

Good lead-in wires have been made of the inner conductor and insulation of RG-8/U cable *with the outer sheath and braid skinned off*. Don't attempt to use coaxial cable in the conventional manner, because the shunt capacitance between the inner conductors and other braid will route some of your power to ground, constituting another loss. Coax cable was not designed for use with marine antennas.

Where it is necessary to go through decks or bulkheads, high-grade feedthrough insulators should be used. (See Fig. 2.) Glass, polystyrene or highly glazed porcelain or steatite insulation is good, but in ceramic insulators watch out for unglazed spots through which moisture might seep. Husky transmitters have gone off the air because of a little salt in the insulators.

Fig. 3. A well installed ground plate gives better antenna loading and a stronger signal.

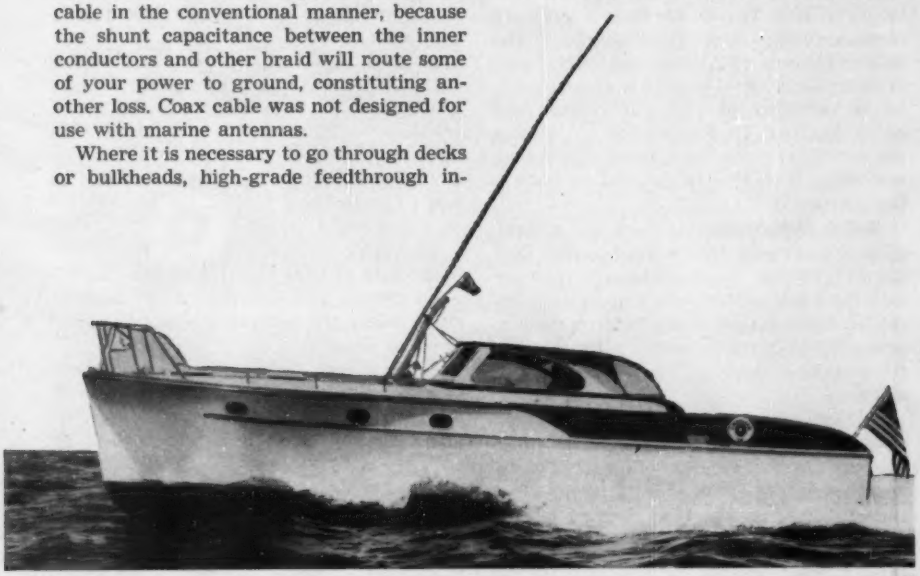

RADIO
CHINE LINE
12 SQ. FT. SHEATHING COPPER
FASTENING — BRONZE OR COPPER
EDGES SCREW FASTENED
KEEP AS FAR FROM OTHER METAL FITTINGS AS POSSIBLE
1/4" BRONZE BOLT
PROVIDE EXTRA NUT & WASHER
CALK UNDER WASHER
4" X 4" OAK BLOCK
SEALED TO HULL
HULL
COPPER
BRAZE BOLT TO COPPER. SOLDER ACCEPTABLE
BOLT TO BE ACCESSIBLE FOR CONNECTION IN BILGE, LOCATED AS NEAR RADIO AS POSSIBLE

The Ground System. Marine radiotelephones are built to work into a Marconi antenna system, in which a good ground connection is essential. A good ground is one that is close to the radiotelephone, and which has the lowest possible resistance.

If your boat is metal, you have no problems. Connect the radiotelephone ground terminal to the nearest solid member of the boat and you have the best ground that can be realized. Use heavy wire—a good rule is to make the ground lead the same size as the battery-power leads—and install a bolt and nut in the boat member for the ground terminal.

A ground plate of large surface area is next best. For passenger-carrying boats, the FCC calls for bare plate or strips (or a combination of both) of corrosion-resistant metal having at least 12 square feet in aggregate area, affixed to the hull below waterline. (See Fig. 3). You can figure that if this recommendation is good for commercial vessels, it is also good for pleasure craft; try to meet this standard if the construction of the boat permits.

A good ground plate can be made of



flashing-copper sheet, available from hardware and plumbing supply stores. Fasten the sheet to the bottom, or alongside keel or deadwood, with bronze or monel screws spaced 1″ around the edge and about 6″ apart across the center area. Do not use common brass—it will soon corrode.

For connection, install a ¼″ bronze bolt through plate and hull, as close to the telephone as possible, backing it on the inside of the hull with bedding compound as shown in Fig. 3. You can solder the head of the bolt to the copper with a torch or a very heavy soldering iron.

On many boats an external ground plate is out of the question. Your best bet, then, is to install the copper sheet or strips inside the hull below the waterline, connecting them together and soldering or bolting your ground wire to a point close to the telephone. Copper screen might be used here—solder a bead along the edges so all wires are tied into the circuit; however, this cannot be expected to last as long as heavier material.

The last and poorest expedient for a ground is just to connect to the engine. This should be a temporary measure at the most. There is no use spending hundreds of dollars for transmitter watts and then throwing most of them away for the lack of a good ground.

In any event, always bond the motor to the radio-ground connection with wire of at least No. 10 gauge. In the case of outboard motors, connect the motor covers to the motor frame as well. Also bond metal tanks or other large metal objects or pipes—every bit of extra metal adds capacitance and helps improve ground efficiency. *Always* use heavy wire for the ground connection, and route it in as straight and as short a line as possible.

Solid Mounting. Objects on a boat often are severely tossed and pounded, and anything which is mechanically insecure may not stick around very long. Poorly installed antennas get badly bent or broken, or wrenched completely off the boat, sometimes taking part of the superstructure along.

Side-mounting insulators should be spaced as far apart as possible, and used only on boat structures which will withstand many pounds of pull. If there is no such member on the boat, it may be advisable to install a stub mast from the keel up through the deck on the boat's centerline, to hold the antenna. This makes a very shipshape job.

There are several antennas which are light enough to be installed on deck or cabin top on an insulated base mounting. These are very neat, as well as being easy to install. If the deck is thin or flexible, back it up underneath with an oak or mahogany block, preferably cambered to the deck line and secured to adjacent beams or carlings (fore-and-aft beams under deck or cabin top).

Measuring Antenna Efficiency. At a laboratory, the job of measuring antenna efficiency would involve a van load of black boxes and a corps of specialists. However, simple measurements can be made which show whether a boat antenna system is poor (10% efficiency or less), fair (20% efficiency), or excellent (30% or better). The system is based on the familiar formula: power = (current)^2 × resistance. This is juggled around to read: resistance = power/(current)^2. If you know your transmitter output power and the antenna current, the latter formula will give you the total antenna-circuit resistance.

Transmitter output can be measured with a dummy antenna of known resistance, at standard input voltage and plate current to the r.f. amplifier. Or, for comparative purposes, you may assume that output is 50% of the plate input. When the transmitter is tuned, measure the r.f. antenna current at the transmitter, and apply the formula.

As an example, suppose your transmitter output is ten watts and the antenna current is 0.7 ampere. Your total antenna-circuit resistance is 20 ohms. Now, if the antenna height is such that the radiation resistance is 2 ohms, it follows that there is an 18-ohm loss resistance and 10% of the transmitter output is being radiated.

Your object: cut that loss resistance. Make sure of wire size, insulation, cleanliness, dryness, and connections. By hook or crook, make the equivalent ground area as great as possible.

Follow these common-sense procedures and you will have the most effective antenna your boat will carry. You may be amazed at how far a few watts will go.

EDITOR'S NOTE: Excellent grounding has been achieved in our Trojan 22′ inboard cruiser using Dynaplates designed to substitute for conventional ground systems.

By
LOUIS E. GARNER, JR.

Transistors or Tubes in Marine Gear?

A boating enthusiast asks . . .

"Should I wait for transistorized gear?"

Some—but not all—electronic gear for boats is transistorized. Since transistors have been widely publicized, many prospective users wonder if they should delay adding such equipment to their boats until fully transistorized units are available. Here, an imaginary interview between Bill, a boating enthusiast, and Ed, an electronics expert, serves to answer some of the questions about transistorized gear which have been puzzling boat owners.

Bill: Some of the fellows down at the Marina have been batting around this question of tubes versus transistors. We'd all like to get more electronic gear for our boats. And from what we've heard, we'd like to buy transistorized gear. But much of the equipment now available uses vacuum tubes. As a result, we don't know whether to buy now or to wait until fully transistorized equipment comes out. Wonder if you could help us reach a decision?

Ed: I'll try. What do you want to know?

Bill: First off, transistors are better than tubes, aren't they?

Ed: That's a loaded question if I ever heard one. Transistors and vacuum tubes are *different types* of devices. Each has its advantages and disadvantages. Transistors are better than vacuum tubes for some applications. But the reverse is also true.

Bill: Well, I can understand that. A 40-horsepower outboard motor is better than a 15-hp. job for a small cruiser, but not for a two-man dinghy. But let's get down to cases. What are the transistor's advantages compared to the vacuum tube.

Ed: Generally speaking, transistors are much smaller than vacuum tubes, weigh

a fraction as much, and have a much longer service life. They are more rugged mechanically, and some types can stand shocks as great as those encountered by being fired from guns. In most applications, transistors are much more efficient than vacuum tubes, requiring but a fraction of the power to do a given job. Finally, and this is most important when mobile or portable applications are considered, they can operate efficiently on low voltages—such as the 6- and 12-volt power sources available on small boats.

Bill: I guess that explains why most portable radio receivers are transistorized. But I've noticed that most transistorized receivers are more costly than vacuum-tube receivers. Why is that?

Ed: You've hit on one of the transistor's disadvantages, although it's probably a temporary one. At the present time, transistors are still more costly than vacuum tubes, and because common types provide less gain than vacuum tubes, you may need a five- or six-transistor receiver to duplicate the performance of, say, a four-tube radio set. These two factors tend to raise the cost of transistor equipment. But transistor prices are coming down. In fact, they've been dropping steadily since the first transistor was manufactured for commercial sale. At the same time, transistors are constantly being improved.

Bill: But I suppose there are applications where the transistor's high cost is offset by its advantages. That's true, isn't it?

Ed: Right! Where equipment weight, ruggedness, size, and power considerations are more important than cost, the transistor holds a decided edge on the vacuum tube. Thus, transistors are ideal for shipboard radio receivers, radio direction finders, compact depth indicators, and fish locators. In addition, there are a number of applications where the transistor may actually be less costly than the vacuum tube.

Bill: But the transistor's chief disadvantage is cost, isn't it?

Ed: In a general way, yes. For example, while no manufacturer is now producing *high-power* radio-frequency transistors, there are moderate-power units available—transistors capable of delivering several watts at frequencies up to ten or twelve megacycles, well above the 2- to 3-mc. band used for ship-to-shore radiotelephone. But, if a ship-to-shore radiotelephone were designed to use such transistors, its retail price might be as much as five to ten times higher than currently available partially transistorized equipment.

Bill: I guess this means transistors can't be used in power applications—right?

Ed: On the contrary. There are many power transistor types available, and some of these are capable of handling quite high power, but at low frequencies. Most low-cost automobile radio receivers, for example, are "hybrid" sets using both tubes *and* transistors. Interestingly enough, the transistors in these sets are used in the audio *power output* stage.

Bill: A friend of mine has a ship-to-shore radio transmitter. The unit requires 500 volts d.c. for its plate supply. At the moment, this voltage is supplied by a vibrator power pack. But my friend has had a lot of trouble with the vibrators; he has to replace them quite frequently. Can transistors be used in a d.c.-to-d.c. power supply?

Ed: A cinch. It's only a matter of circuit design. Transistor power supplies are more efficient and less noisy than either vibrator power packs or dynamotors, and, most important, generally require far less maintenance.

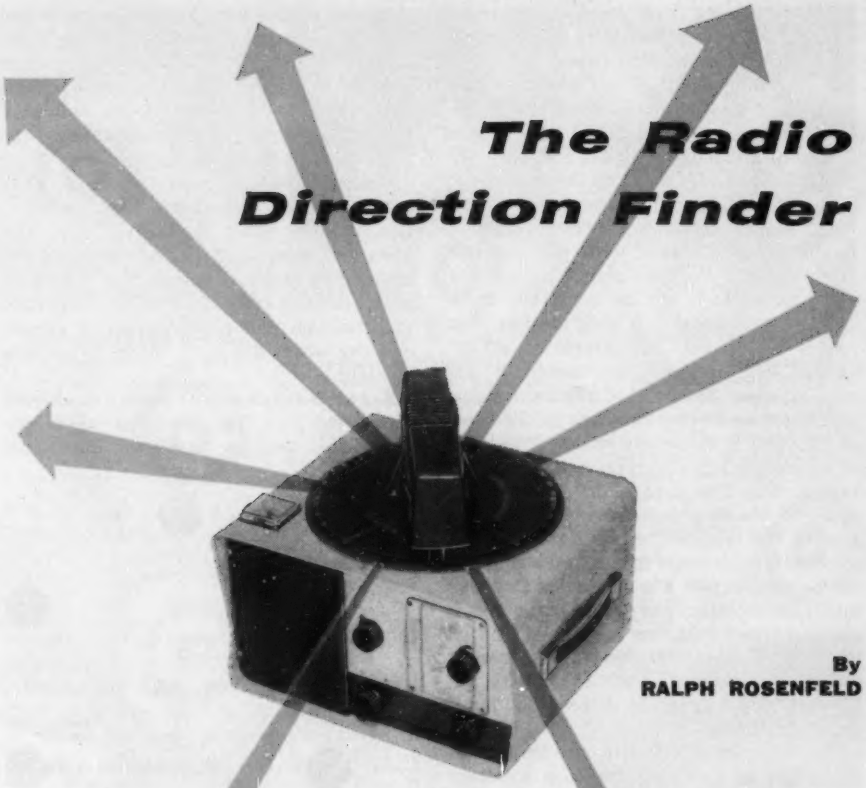
Bill: How about summing it up for me?

Ed: Okay, I will. First, low-power gear can be *fully* transistorized. Transistors can be used effectively in power converters—incidentally, d.c.-to-a.c. supplies are sometimes called *inverters*. And ship-to-shore radiotelephone equipment can be partially transistorized without becoming too costly. Finally, transistorized marine gear offers smaller size, lighter weight, improved ruggedness, less maintenance, and more efficient operation, with a resulting saving of your boat's power supply.

Bill: Then how would you answer the question, "Should I wait for transistorized gear?"

Ed: Let's put it this way. You can't enjoy any equipment while it's sitting on your dealer's shelves. Equipment which may not be available for a year—or two—or three—can't provide much safety or convenience this season! Even though transistors theoretically are ideally suited for marine electronic equipment, if you can't buy the piece of gear you want, theoretical advantages don't do you much good. A wide range of tube-operated and transistorized equipment is available today. So, like the man says, "You pays your money and you takes your choice."

The Radio Direction Finder



By
RALPH ROSENFELD

IN TIMES of bad weather and low visibility, a radio direction finder can be an invaluable navigational aid, especially for small boats in coastal areas. And it is simple to operate.

Commonly called an RDF, the radio direction finder can take very accurate bearings on marine radio beacon stations, regular broadcast stations, and any radio station which the receiver can tune in and whose position is known. Bearings on other ships' transmitters can also be taken.

If you can't afford a gyrocompass, a dead-reckoning indicator, or radar equipment, an RDF is your best insurance in foul-weather navigation. Portable transistorized equipment can be installed on the smallest of boats without any difficulties about current requirements, weight, or expense. Even if you do have radar, the RDF can't be beat as a quick navigational check.

How It Operates. All radio direction finding equipment is based on a simple principle—the fact that a loop antenna is very directive, that is, it tends to pick up radio signals coming from one direction more strongly than from another. If the loop antenna is connected to a radio tuned in on a specific station, the station signal will be strong or weak depending on how the loop is turned. If the loop is turned for the minimum signal, and the location of the radio station is known, it is possible to determine the directional angle with respect to a magnetic compass reading, and the result can then be plotted on a chart.

Of the three components making up an RDF—a highly sensitive receiver, a directional rotatable loop antenna, and a signal null indicator—the most important is the loop antenna. The better the directivity, or "sharpness" of an antenna, the more accurate the bearing.

Loop Antennas. Available in many shapes and forms, a loop antenna may be wound or pressed into an insulating mate-

rial; or it may be in the form of a doughnut winding encased in plastic or metal tubing, as in the Munston "Bay Shore" shown on the preceding page, or the doughnut may be formed into a square or rectangle.

Although some loops may be as large as a foot in diameter, compact and very efficient loops have recently been designed around a solid core of special magnetic material known as ferrite. Loops wound on ferrite cores (as used with the Munston "Bay Shore"), may be only 7 inches long and 2 inches high, but can be just as sensitive and directional as a large air-core loop.

The directional characteristics of rotatable loop antennas are shown in diagram at right. The point of minimum signal pickup for an air-core loop is in the direction of "A" and is extremely sharp. The point of maximum signal pickup is in the direction of "B." This is the point at which the plane of the loop is parallel to the direction of the incoming wave. However, the maximum response is rather broad and cannot be used to give a sharp indication. The minimum is called the "null" point and is normally used in taking a bearing. That is why the pointer attached to the loop is always at right angles to the plane of the air-core loop, i.e., in the direction of minimum sensitivity.

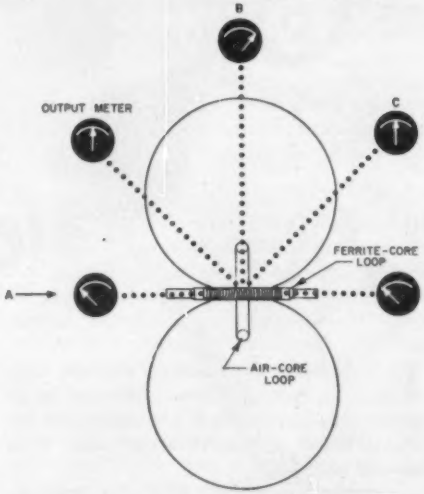
The behavior of a ferrite-core loop is the same, but in this case the loop windings are at right angles to the axis of the ferrite rod on which the windings are placed. Hence, minimum signal (null) occurs when the rod points to the station. Under these conditions, the actual loop windings are at right angles to the direction of the incoming signal, just as was the case with the air-core loop.

Frequencies Used. RDF receivers may cover only marine radio beacon frequencies, or they may also cover broadcast and shortwave frequencies. In general, bearing accuracies improve as the frequency in use is lowered and deteriorate as the frequency is increased. The loop normally operates on vertically polarized signals traveling horizontally (ground waves); but when confronted by combinations of ground and downward (sky) waves such as are found at the higher frequencies, the induced voltages can result in a serious bearing error. The more accurate frequencies for direction finding are in the 190 to 400 kc. band. This band contains both Coast Guard radio beacons and airway beacons.

Marine radio beacons are transmitting stations located on lightships and at lighthouses. Most beacons transmit a series of identifying code letters during a specified time period. Their frequencies and position are shown on charts published by the U. S. Coast & Geodetic Survey.

Coastal broadcast stations in the 540 to 1600 kc. region may also be used for direction finding. And, during daylight, frequencies above 1600 kc. can be used for moderately accurate bearings, if the transmitter location is within 20 miles. Errors due to refraction and combinations of ground and sky waves are more likely to increase at night.

Error Sources. All metallic objects aboard the boat (such as metal masts, guy wires, etc.) tend to distort the directional

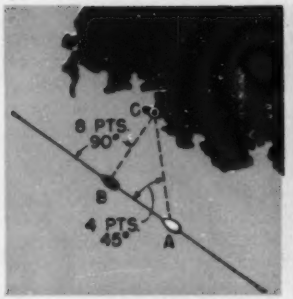


Directional radio reception pattern of a loop antenna. The meters show signal strength in various directions from the plane of the loop.

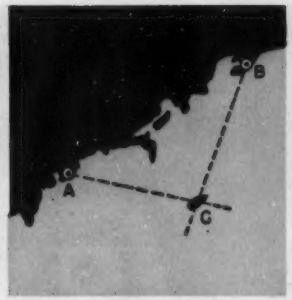
pattern of the loop. Such errors are accounted for by constructing a card similar to the deviation card used with the magnetic compass. These errors vary with the radio bearing relative to the ship's heading (and not the ship's heading alone, as do the deviation errors in a magnetic compass).

The instrument error in taking a radio bearing may be ± 2%. The probable error due to calibration problems will be at least one degree. Consequently, the over-all error might be ± 3%.

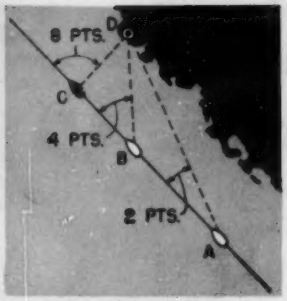
It is quite essential to practice using the



Four-Point Radio Bearing
Observation A on radiobeacon C is taken over bow at 4 points or 45°. The log is read or time noted. Another observation, B, is taken on C at beam or 90° and log read or time noted. The distance run from A to B will equal distance from vessel at B to C.



Cross Bearing
A bearing is taken on radiobeacon A and at the same time another bearing is taken on radiobeacon B for the same position, and these bearing lines are drawn on the chart. The position of boat will be at or near the intersection of the two bearing lines, point C.



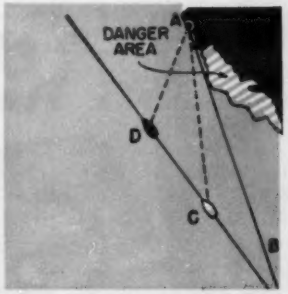
Doubling the Angle
Bearing on radiobeacon D is taken at 4 points or 45° from B on the same course and again at 8 points or 90° from C. The distance between points of observation is noted from the log. Thus, according to a simple geometric identity, AB equals BD and BC equals CD.

equipment. Don't wait until you are lost in a fog.

Using the RDF. Bearings taken on the RDF should be used in the same manner as visual bearings. Accuracy improves as the boat gets closer to the transmitter. A note of caution, however: if you take a radio bearing "over the bow" and steer for it "dead ahead," beware of piling up on the rocks in front of the beacon station, or running down another vessel while navigating in a heavy fog.

Some beacon stations send out a radio signal simultaneously with a foghorn signal. The radio signal arrives at your boat almost instantaneously but the sound from the foghorn travels only at the speed of sound, about 1100 feet per second. If you hear the foghorn 33 seconds after you hear the radio beacon signal, you know you are about six miles from the beacon. This information, along with a directional bearing from the RDF, can give you your approximate position. Accuracy of distance measurement is about 10%.

Many a skipper has come to rely on his RDF as a prime means of navigation. In view of its low cost, ease of operation, and invaluable assistance in poor weather, it seems quite possible that an RDF will soon be carried by every small boat as standard equipment.



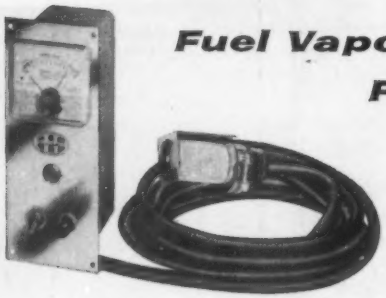
Danger Bearing
Draw through A the line AB clear of all danger and note direction by compass rose. If bearings on A from C and D show AC and AD to be to the right of AB, you can be sure that your ship is on the left or safe side of the danger line.

Diagrams above courtesy of Raytheon Mfg. Co.

Shipboard-TV Keeps the Kids Happy

FAMILY LIFE aboard a boat has its problems, and one of them is keeping the small fry occupied during the long hours at dockside. A solution is to keep a portable TV set aboard and plug it into the dock's 117-volt a.c. power outlet when the boat is tied up. When the boat is under way, 117-volt power can be provided by a transistor power converter such as the Heath PC-1.

Since space is at a premium on small cruisers, one of the new shallow wide-angle tube sets should be used, like the General Electric "Gramercy" 17" set shown here. It's a good idea to use a set that has a full power transformer to minimize shock hazard. The case should be of plastic or metal, with a fully enclosed back.



Fuel Vapor Detector Prevents Explosions

EVERY BOATMAN knows that fire or explosion at sea is a deadly hazard. Vaporized fuel can explode and cause the destruction of a valuable boat, plus personal injury or even death. A half-cup of gasoline spilled in the bilge can increase the vapor content to the point where a single spark could cause an explosion violent enough to destroy the boat and its occupants.

Instruments to detect gasoline or fuel vapor are commercially available but rather expensive. However, a fuel vapor detector in kit form can be had for $35.95. The Heathkit FD-1-6 (above) consists of a detector which is placed in the engine compartment and a control head which is mounted on the bridge or in the cockpit.

The detector used in the FD-1-6 is a screened housing made of Monel metal which shelters two filaments. One filament is sealed within glass and the other is in an open glass enclosure; the sealed filament is the "standard," the other samples the air in the engine compartment. When the molecular weight of the surrounding atmosphere changes due to the presence of explosive gases, the resistance of the unsealed filament changes and unbalances an electrical bridge circuit, registering "safe," "dangerous," or "explosive" on a meter.

This simple safety device is energized by the boat's battery, or by an auxiliary six-volt battery. A pilot light on the control head glows when the device is turned on. If the detector unit is burned out, the lamp will glow dimly. If one of the detector filaments is burned out, the meter will indicate a dangerous condition. For safety's sake, a spare detector unit should be kept aboard the boat.

Low-cost reliable ship-to-shore communications

By
DONALD L. STONER
W6TNS

Citizens Band Radio for Small Boats

ALTHOUGH there are more than seven million pleasure boats splashing about on our country's waterways, the latest report from the Federal Communications Commission reveals that only 65,000 vessels are equipped for two-way radio communications. Even if you assume that all of the 65,000 radio-equipped boats are pleasure craft, this figure still represents far less than 1% of the total pleasure craft in use.

One reason for the lack of more radio-equipped boats in the past has been the high cost of equipment and the additional costs of professional installation. A typical radiotelephone on a commercial fishing vessel is priced in the neighborhood of $1000. After the equipment is purchased, it must be installed and serviced by licensed technicians.

But this picture is rapidly changing. One recent development now makes it possible to purchase not one, but two radios, for less than $250. One can be installed in your boat, and the other located anywhere you like. If it's too rough for boating one weekend, you can take the two units to the mountains and use them for communications there.

Citizens Band. The new Citizens Band allocation makes this possible. The Federal Communications Commission has set aside a small segment of our crowded short-wave bands for wireless communications by "Mister Average Joe." This band consists of 22 individual channels grouped near 27 mc. (just below the 10-meter "ham" band). Any citizen of the United States over 18 years old can obtain a license simply by applying for it. There are no stiff examinations or code tests.

Citizens Band equipment can be used anywhere, not just between your boat and house. You can use it between your boat and auto or between your home and car. Applications are limited only by your imagination. Small, portable transmitter-receivers are available which work either on 117-volt household current or on 6-12

volts d.c. from your car or boat. Some units will work on either power source simply by the flip of a switch.

On land the useful range of Citizens Band equipment is usually reduced because of buildings, trees, etc., but out on the "briny deep" you can expect optimum performance because there are no obstructions and reception is always "line-of-sight." With the antenna mounted 20 feet above the deck, good reception at up to five miles should be attainable, with ten miles being the outer limit for reliable radio communications.

Obtaining Your License. When you purchase a transmitter-receiver (sometimes called a transceiver), you will find a license application packed with the unit. If such is not the case, it can be obtained by requesting a Citizens Radio License Application (Form 505, dated Sept. 1958) from your local FCC office.

Before you fill out this form, you should obtain a copy of the Citizens Band Regulations, Part 19. You swear that you have read (and understood) the regulations when you sign the application form. This document is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for ten cents in coin.

The form includes a "work sheet" which you keep as a copy of the application. You can do this part in pencil so it may be changed if necessary. When you are sure all is correct, type up the application (and its four copies), and have it notarized. If you have any trouble "battling" with the form, ask whoever sells you the equipment to help you out.

Airmail the application directly to the Federal Communications Commission, Citizens Radio License Division, Washington 25, D. C. Do *not* send it to your local FCC office.

Don't expect any action for at least 90 days because the Commission is currently flooded with applications. If you are in a hurry to use your radio station, your license will be forwarded to you by air if you enclose a seven-cent airmail stamp along with your application. This will not shorten the handling time, but may cut the overall delay by a number of days. If you urgently need to get your station into operation, you can request that you be notified by collect telegram when your application has been processed. This will permit you to put your station on the air while your license is in the mail.

Installation. The best part of Citizens Band operation for small boat owners is that no professional aid is required for the installation of the equipment. And your completed installation need not be inspected by the FCC.

If your boat has an electrical system, connect the radio as indicated in the instruction manual. If your boat does not have an electrical system, an automobile battery will provide power for a full day's communication. Make a wooden box for transporting the battery or purchase one of the new plastic units now available. In some convenient spot in the boat you can build another box that the battery carrier will slip into. The radio unit can be strapped to a seat or bulkhead. Connect the mike, battery, antenna, and you are ready to go on the air.

You can either build a Citizens Band antenna yourself or buy one ready-made. In either case, the tip of the antenna may extend no higher than 20 feet above the deck of your boat, in compliance with Federal Communications Commission rules.

The engine, whether inboard or outboard, *may* cause electrical interference. The cure is similar to suppressing auto interference, and amateur radio handbooks can be consulted for the various means to correct this. Your boating supplier could also be of assistance with this problem.

Performance and range can sometimes be improved by grounding the radio equipment to a metal keel or a copper strip running the full length of the hull under water. Twelve square feet of copper is recommended. (See article entitled "Small Boat Antenna Systems" beginning on page 75.)

To protect the radio equipment from salt spray, make a plastic bag to cover the equipment when it is not in use. Also make sure that the transceiver doesn't get a dose of salt spray while you're flying over the whitecaps. Salt water can play havoc with the parts and wires used in radio gear, necessitating expensive repairs.

EDITOR'S NOTE: Citizens radio is not a substitute for the marine radiotelephone. Using the Citizens Band, you cannot place a land telephone call nor can you summon the U. S. Coast Guard directly, but you will find it a useful communications aid.

Photo courtesy of Raytheon Mfg. Co.

Radar and Loran

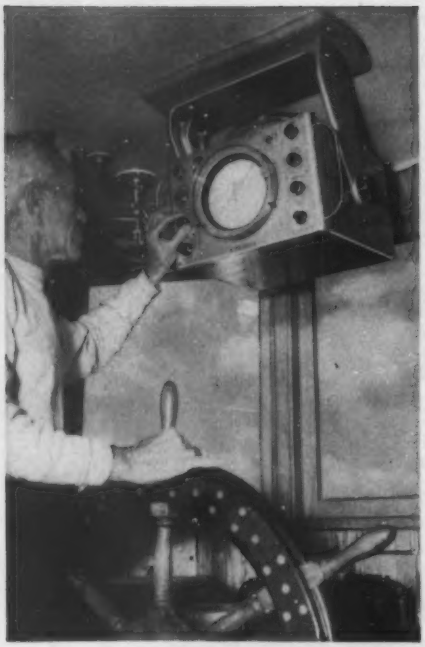
Vital electronic aids to navigation

By CLARK E. JACKSON

FOR MORE than a decade, the navigator has had electronic eyes which penetrate fog and darkness, seek out hidden dangers, and chart the surroundings for him. Radar (Radio Detection and Ranging) was a secret word during the early part of World War II and has been credited by many as having been most instrumental in bringing victory to the Allies in Europe and the Pacific. Loran (Long Range Navigation) was also developed during World War II as a rapid and simple way of getting accurate navigational fixes. Today more and more standard navigational charts have loran lines, making it possible to transform a loran receiver reading directly into a graphic navigational fix.

RADAR

A crude form of "radar" was in use before electronic radar came into being. From the beginning of time, navigators have used audio signals to determine their distance off steep shores hidden in fog, by sounding a short blast with a whistle or horn and then listening for the echo. Knowing the speed of sound to be approximately 1100 feet per second, if it took five seconds for



Ceiling radar installation saves space and allows shorter lead-in cables to antenna atop wheelhouse. (RCA photo)

an echo to return, the shore or cliff was known to be about a mile away.

A radar unit transmits short bursts of microwave radio energy (between 1000 and 30,000 megacycles) which are reflected by solid objects. Distance is determined by the length of time it takes a radar pulse to hit a target and return. Since radio waves travel at the speed of light—186,000 miles per second—the time from the instant a radar pulse is transmitted to the instant the echo returns is measured in microseconds (millionths of a second).

In a typical radar unit, more than a thousand pulses per second are transmitted in rapid succession as if fired from a machine gun. The pulses are spaced far enough apart in time to allow an echo to return before the next pulse is transmitted. The time required for a pulse to travel to a target and return as an echo is measured on a cathode-ray tube, similar in many respects to a TV picture tube. The echoes appear on the round screen as glowing "blips."

Antenna Requirements. Radar pulses should travel in a narrow beam in order to allow the detection of small objects and the determination of direction as well as distance. A modified form of parabolic reflector, the so-called "dish" antenna, is used to focus microwave signals into a narrow beam. The antenna is rotated 360° horizontally so it can scan in all directions, and the antenna rotator motor is synchronized with another motor at the radar screen.

As the antenna rotates, the trace line on the radar screen sweeps around with it. This is done by rotating the magnetic sweep coils around the neck of the cathode-ray tube. The sweep starts at the center of the round tube face and rotates in step with the antenna. It looks something like a windshield wiper. Blips appear along the trace whenever a radar echo is received.

A long-persistence picture tube is used, so that the echoes remain on the screen until the sweep has rotated a full revolution and sometimes longer. As the radar beam rotates, a map of the surrounding area is "painted" on the screen. Large areas, such as the shoreline and islands, appear as large lighted masses. Boats and other small objects appear as small blips. Lighter hash or clutter may appear near the center of "home" point on the screen due to "sea return," a mass of echoes from the surface of the water.

Although marine radar equipment sometimes has a range up to 40 miles, maximum range is limited by the height of the antenna above water. Radar is a line-of-sight device, and as the antenna height is decreased, the effective range is reduced. While it might be interesting to see objects 20 miles away, objects within a range of eight miles are generally of more concern to the navigator.

Typical Installation. A marine radar installation consists of a transmitter, receiver, antenna, monitor, and power supply. One antenna serves both transmitter and receiver since the transmitter is turned on for only a microsecond or so and then pauses to allow the receiver to intercept the echo. The antenna is automatically switched from the transmitter to the receiver electronically.

Use of radar on pleasure craft is limited by space, the capacity of the electric power source, and the owner's pocketbook. Prices for radar units start at about $1500. Power requirements are heavy, running from 300 watts to more than 1500 watts, which

Lightweight, low-cost radar equipment can be installed on a 28-footer without placing too much of a burden on the ship's battery. (Bendix-Pacific photo)

means that small boats equipped with 12-volt batteries may not have enough reserve electrical power for radar equipment. An auxiliary generator driven by a small engine can be used if a boat does not have 32- or 115-volt batteries.

An FCC radio station license is required and the radar equipment must qualify for FCC type acceptance. It must be installed and serviced under the supervision of a person holding a suitable FCC operator's license endorsed for radar. The master of a vessel, however, may use a licensed radar set without being required to have an operator's license. No one else may use the radar except under his personal supervision.

LORAN

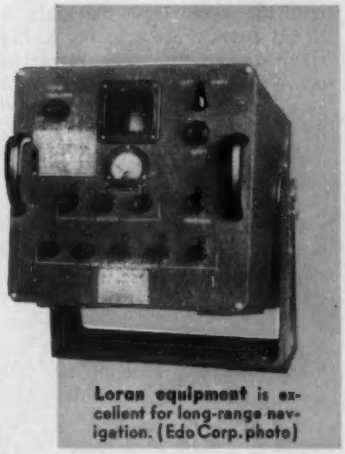
Conventional navigational devices such as radio direction finders are being supplemented on military and commercial vessels by loran, with its longer range than a conventional radio direction finder, no loop to rotate, and greater accuracy. Like radar, loran employs pulses, but operates at much lower frequencies (1750-1950 kc.) Loran, however, does not require a transmitter on board ship.

Sometimes called an "electronic stop watch," loran measures the difference in the time required for radio signals to arrive from different synchronized radio stations. Since radio waves travel at constant velocity, the traveling time of a signal is proportional to the distance between transmitter and receiver.

Chain of Operation. A loran chain consists of two or three radio stations, a "master" and one or two "slaves." These transmitters are located from 200 and 400 miles apart and transmit short pulses simultaneously or offset by a precise time interval. The pulses are repeated between 25 and 35 times per second.

The difference in arrival time of signals from a group of loran stations is measured by a loran unit aboard ship. To get a "fix," it is necessary to take readings on two pairs of loran stations or a single three-station loran chain. The ship is located at the point where the hyperbolic curves or distance lines on the loran chart intersect.

Daytime range of loran is around 700 miles over water and about 450 miles at night, using the direct ground wave from the loran stations. At night, the reflected sky wave permits use at distances up to 1400 miles, but the results are less accurate. Error in line position of up to ± 3 nautical miles and in fixing of up to ± 10 nautical miles is apt to occur in using night sky waves at extreme distances.



Loran equipment is excellent for long-range navigation. (Edo Corp. photo)

Power requirements for loran are more modest than for radar (as little as 135 watts), but the cost of the equipment is about the same, starting at around $1500. For reliable fixes in all kinds of weather, loran is of great importance to the boatman who ventures offshore beyond the range of radar or direction finders.

Depth Sounders and Fish Finders

By LEO G. SANDS

TO MANY boatmen, the depth sounder is the most valuable piece of electronic gear one can have on a small boat. They find that it can be used as a navigational aid, a fish finder and a safety device.

It is easy to navigate with the aid of a depth sounder by comparing depth readings with the water depth markings on navigational charts. As a safety device, the instrument continuously monitors water depth and indicates the location of shallow areas and submerged objects. Fishermen no longer have to try fishing various spots, hoping to make a catch; instead, with a depth sounder, they can find the fish electronically.

Echoes Measure Depth. Also called a fathometer, a depth sounder transmits *sound* pulses through water and measures distance by noting the time it requires for a pulse to travel to an underwater target and for the echo to return. It is a form of *sonar,* which is used by the military for locating submarines as well as vessels.

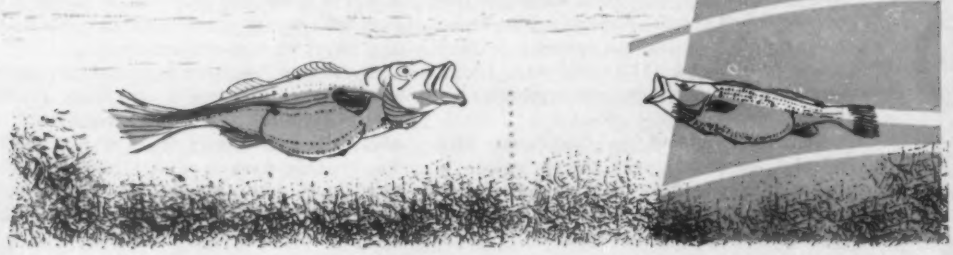
A sonic pulse, as produced by a depth sounder, travels at a speed of about 4800 feet per minute through water. Although it is called a sound or sonic pulse, it is really an *ultrasonic* pulse, since it is too high in pitch to be heard by the human ear.

Pulses are generated by an electronic oscillator whose output frequency is somewhere in the range between 30,000 and 200,000 cycles (30-200 kc.). Actually, the oscillator produces a continuous frequency which is turned on and off to form pulses. One pulse is transmitted for each sounding.

The pulses are fed to a device called a *transducer,* which converts the electrical energy into sound waves (like a loudspeaker) directing them toward the bottom. The short burst of sound waves travels downward as a cone of sound. When the sound waves strike a solid object, such as the bottom, a submerged log or a school of fish, they are reflected back to the transducer (see Fig. 1). These reflected sounds are called *echoes.*

Distance is determined by measuring the time it requires for a sonic pulse to travel to the bottom or other target and return as an echo. If the water is 100 feet deep, for instance, it will take about 42 milliseconds (0.042 seconds) for the round trip. Depth sounders, however, can pick up more than one echo, so that it is possible to determine not only how deep the water is but also how far below the boat and how far above the bottom a passing school of fish might be.

Neon, Scope or Tape. All depth sounders for use on small boats operate on the same basic principle, but vary in the manner in which depth information is displayed. Most use a rotating flashing neon lamp whose position along a calibrated circular scale indicates depth in feet or fathoms or



Four basic types of depth finders are, from left to right, the recording fathometer (Raytheon), rotating flashing neon lamp type (Ross), meter indicator type (Bludworth Marine), scope type (Edo).

both. Others use an oscilloscope or a direct-reading meter. Depth recorders use a paper tape on which the distance to submerged objects and an outline of the contour of the bottom are recorded.

Most depth sounders employ from three to seven tubes and operate from a 6- or 12-volt battery, using a vibrator power supply to convert the d.c. to a.c. for operation of a small motor, whose function will be described later, and to provide a.c. for the plate voltage rectifier. The tube-type depth sounders require from 2 to 8 amperes when operated from a 6-volt battery and from 1 to 4 amperes when operated from a 12-volt battery, depending upon the make, type and complexity of the instrument.

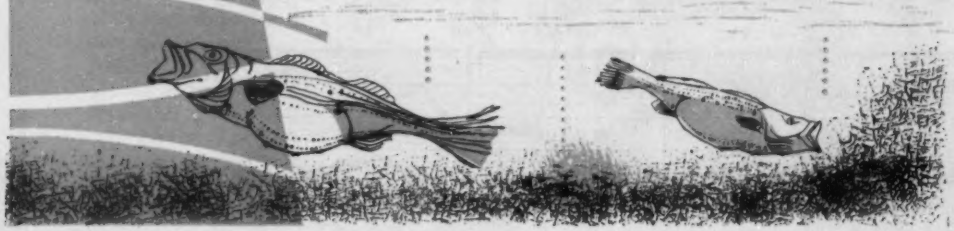
Transistor-type depth sounders have been introduced recently, such as that made by Ross Laboratories, Inc., which operate from self-contained dry batteries. One of these uses a 7½-volt battery; current drain is only one-tenth of an ampere, and battery life is rated at 300-500 hours of operation.

Flashing Light Indicator. The electronic circuitry consists of an ultrasonic transmitter and a receiver plus means for actuating the indicator. In the types that use a flasher indicator, the neon bulb is attached to a disc or arm which is rotated by a small electric motor at a constant speed somewhere between 200 and 3600 rpm, depending upon depth wanted and the make and type of instrument. The disc is behind a translucent circular (or semicircular) scale calibrated in feet, fathoms or both.

The neon bulb always flashes when it passes the scale zero position, at which time a pair of switch contacts turns on (triggers) the oscillator. It is at this moment that a pulse is transmitted. The switch contacts open and, as the disc rotates, the receiver waits for the return of an echo. When an echo is received, and amplified, the neon bulb flashes again. The position at which it flashes behind the scale indicates the depth.

When more than one echo is received, more than one flash will occur at different points along the scale. The brightest flash, however, is generally the one caused by the echo from the bottom. When only a depth reading is desired, the extra flashes can usually be eliminated by adjustment of the sensitivity control.

A pulse is transmitted only at the time the neon bulb passes the triggered zero position. In some depth sounders, the neon lamp disc rotates two turns between pulses to extend the time allowed for receipt of



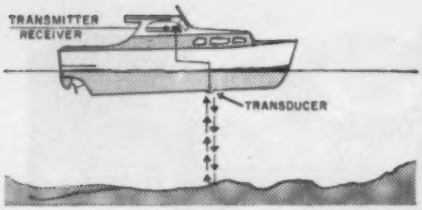


Fig. 1. Depth sounders operate on the principle of sound reflection from the sea bottom. A transducer mounted below the waterline alternately sends out a sound pulse and listens for the echo, with the elapsed time shown on some type of indicator.

echoes, and thereby double the range.

In more elaborate depth sounders, a cathode-ray tube is used as the indicator. The echoes may be seen along a calibrated trace. This type of indicator is obviously more expensive than the flashing bulb type but provides greater sensitivity.

In a depth recorder, the depth indications are recorded on a paper tape, as in Fig. 2, that is drawn slowly and continuously past a stylus which changes its position in response to intercepted echoes. A permanent graphic recording is made of the contour of the bottom as well as the locations of submerged objects with respect to the bottom. Soundings are automatically made several times a second, resulting in a jagged, continuous trace on the paper which can be viewed as soundings are made or referred to later.

Crystal Transducer. The transducer, which transmits pulses and receives echoes, is something like an intercom loudspeaker since it functions both as a loudspeaker and a microphone. It converts alternating electrical current into mechanical energy which results in transmission of sound waves through the water in a beam about 10° or more in width. As soon as the pulse has been transmitted, the transducer acts as a microphone, waiting for returning echoes. These echoes cause mechanical stresses in the transducer which are converted into alternating current. This current is amplified and used to trigger the indicating system.

Most transducers use a barium titanate or ceramic crystal encased in plastic to prevent entry of water. Generally, the transducer is mounted under the boat, so that the transducer housing makes actual contact with the water. Sometimes it is mounted inside the bilge.

A transducer can be used on a temporary basis. By attaching it to a hollow pipe through which the interconnecting cable is run, the transducer can be dunked in the water by holding the pipe over the side.

Most depth sounders use only one transducer which functions both as transmitter and receiver. Some, however, use two of them, one for transmitting, the other for receiving.

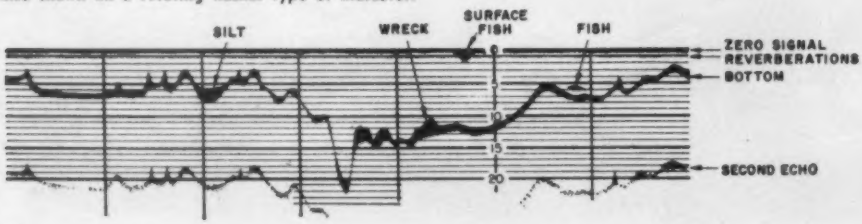
Finding Fish. No FCC license is required for a depth sounder since it does not transmit airborne radio waves. It is simple to operate and can be used at cruising speeds when measuring water depth.

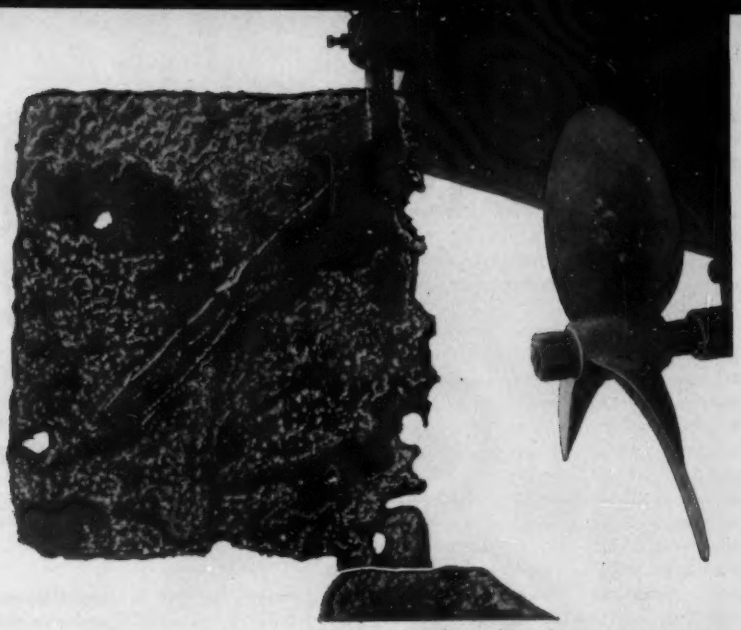
To find fish, however, the boat should move slowly, since the echoes from fish can be very feeble and easily missed. It has been said that the echoes are produced only by the bladders of the fish, and that there might not be any echoes from small numbers of tiny fish. Large fish or heavy concentrations of fish produce strong echoes.

Depth sounders are available from around $125 and up. Most depend upon the availability of a storage battery with which most power boats are equipped. The new portable transistor types, however, can be used on sailboats and even rowboats, from self-contained battery cells.

For the man who takes his fishing seriously, a depth sounder is a must. And, for the man who just likes to sail, the depth sounder is a valuable navigational aid as well as an important safety device.

Fig. 2. This fathometer recording clearly shows the various sound reflecting layers between the surface and sea bottom. The same information is also shown on a rotating flasher type of indicator.





Severe galvanic corrosion in a steel rudder connected to copper-bottom sheathing, bronze shaft and propeller. The boat almost became a casualty.

Electrolysis and Corrosion

How to save your boat from the ravages of electrical corrosion

By ELBERT ROBBERSON

TO A JET PILOT, it's a flameout. To a parkway pilot, it's a flat tire in the Holland Tunnel. For the owner of a boat, it's electrolysis—a boating problem ever since metal parts have found their way aboard.

Talk to old-time boatmen, dealers, or shipyard mechanics, and you'll probably hear plenty about this sea-water scourge . . . stories of boat and engine parts falling off, propellers turned to lace, boats sinking. It's true that these things can happen because of electrolysis, but no conscientious boatman need suffer—because electrolysis is easily prevented. First, however, let's find out exactly what it is.

What Is Electrolysis? The term "electrolysis" has come to be very loosely applied in the small-boat field. What many boatmen call "electrolysis" is often really some kind of corrosion.

Depending upon your dictionary, you will get all kinds of definitions from the simple "The decomposition of a chemical by an electric current," to a fat paragraph in Webster's New International Dictionary dealing with electrolytes, ions, and Faraday's laws.

In the strict sense of the term, electrolysis concerns chemical changes in the *solution* (in this case, the salt water) due to the passage of current. Since we need a

term to work with, however, let's call the corrosion of metal parts involved in electrolysis "electrolysis corrosion."

When Does It Occur? Electrolysis corrosion occurs when direct current, as from a battery or generator, passes through the water from one conductor to another. You can get a good example of this activity very quickly and easily.

Dunk a pair of copper strips in a cup of salt water (table salt will do), and connect them to a 6-volt battery. Bubbles boil from the negative electrode and nothing much happens at the positive one—except that you may observe a green cloud creeping out from it into the water. What is happening is that the metal of the positive strip is going into the solution. In a short while, the weight loss of this electrode can be measured with a sensitive scale. Carry on your experiment long enough and there won't be any positive-end copper left.

This is what boatmen commonly call electrolysis—loss of metal due to battery current between underwater parts. Run battery current between a boat's underwater metal parts, and the positive part corrodes rapidly away. Stop the current flow, and the process halts.

Since no one would reasonably connect a battery between underwater metals on his boat, how can this possibly happen? Very easily, due to the fact that one side of the battery circuit for motors and many electrical boat accessories and lights, etc., is connected to the frame, shell, or "ground."

If you cross-ground one gadget by using opposite ground polarity from that used on any other fixture, you've set up your boat for possible electrolysis corrosion. The damaging current flow can take place through bilge water as well as through the water under the boat; and it has also been known to take place through wet wood. So, when installing fixtures, taking batteries ashore for charging, or doing anything with the electrical system of the boat—keep the polarity of the ground connections the same. Lately, manufacturers have begun to standardize to a large degree on negative grounding; but don't count on it—investigate and be sure.

Another way to invite electrolysis corrosion is to use insufficient heavy wire to supply power to heavy-drain items, such as a radiotelephone, which have ground connections to the water. Voltage drop occurring in the ground leg of the power

supply circuit is just the same as with battery voltage: if there is a difference of potential between points A and B underwater, no matter if the voltage is from a generator, battery, or a voltage drop in a wire, trouble can result. Use large wire for power leads to keep voltage drop close to zero. In addition, it is a good idea to connect grounded objects together inside the boat with a "bonding" wire of at least No. 10 gauge, and also bond in the engine frame and radio ground plate, if any.

Galvanic Corrosion. Most underwater corrosion has no connection whatever with electrolysis, contrary to popular thought. This trouble is simply "galvanic corrosion." It takes place when three conditions are satisfied: the metals are in contact with salt water; they are different in composition; and they are in electrical contact through a metallic path. This forms a galvanic cell—like a primary battery cell. Current is generated, flows through the water, and the metal supplying the current corrodes.

This automatically happens when ordinary hardware-store brass is used for underwater fittings or fastenings on a boat. Ordinary brass is an alloy composed of about 30% zinc and 70% copper. The table on page 96 shows the galvanic activity of boat metals. Note that zinc is at one end of the scale and copper near the other. Result: the zinc is corroded, leaving a spongy copper mass in place of the brass. This has no strength, so holes appear and fastenings disappear.

Many alloys are so cannibalistic that

Electrolysis corrosion can be studied by immersing copper strips in brine, and connecting a battery. In a short time, the current flow will cause the positive electrode to corrode—eventually be entirely eaten.

"Self-devouring" propeller at right suffered from faulty alloy, so zinc block, mounted on wood, above, gave no protection.

they will feed on themselves in this fashion. So, the first rule which must be followed to avoid galvanic corrosion is to use only fittings and fastenings which are made of seaworthy metal: bronze, Everdur, Monel, stainless steel, and—if you are loaded—titanium, gold and platinum. All are extremely resistant to corrosion.

Next, make sure that all of the different underwater metals are of the same family. Avoid galvanized iron or steel if there is copper or any of the other more noble metals around. Always try to use fastenings which are more noble than the metal of the object they are holding in place. This way, if there is the least bit of corrosion, it will affect the comparatively bulky piece of hardware (which can afford to lose a few grams weight) instead of the smaller fastening which may weaken to the point of failure after the loss of just a little metal.

An outboard motor is, unfortunately, mostly active metal, and likely to corrode quite rapidly if given the right conditions. To be on the safe side, when your motor is not actually in use, keep it up out of the water . . . especially if it has a bronze propeller.

The importance of avoiding unlike combinations of metal underwater cannot be stressed too much. And never install an object made of a metal about which you are unsure.

The builders of a beautiful yacht, the "Sea Call," learned this the hard way. Monel is practically proof against corrosion, so they built the underwater shell of pure Monel. But the frames, stem and rudder were steel; and while most of the rivets were Monel, a few steel rivets were accidentally mixed in. Shortly after the vessel was placed in the water, one of these steel rivets disappeared, and people began to get suspicious. Upon dry-docking the yacht, it was found that all of the steel near the Monel metal was rapidly corroding, while the Monel, of course, remained unaffected. The yacht was built in 1915 and scrapped in 1916!

Cures for Corrosion. Prevention is the best cure for corrosion, of course, but many times it is not possible to have conditions as perfect as would be desired. Good underwater metals may pick up dirt or oxide which changes their galvanic activity; small impurities in a metal can create galvanic hot spots; and it is conceivable that somewhat different metals must, of necessity, sometimes be used. On large ships, you will often find combinations of aluminum and steel or bronze.

If it is necessary to use different metals,

Zinc blocks must be connected to metal that they are to protect. This propeller nut has a zinc overcoat. Blocks on deadwood and rudder are connected by copper straps to rudder post and stern bearing.

they must be electrically insulated from each other. Plastic gaskets, Micarta separators and sleeves, rubber or other waterproof insulating material can be used. As long as there is "no circuit," corrosion will stay away.

You can also obtain protection with unbroken coverings of plastic paint, neoprene compound, or other insulating coverings.

But the most popular method of protecting metals which unavoidably suffer from galvanic corrosion was cooked up by Sir Humphrey Davy in 1824. The copper sheathing on warships was corroding. "Attach blocks of zinc to the copper," said Sir Humphrey. The idea was that, being more active than any surrounding metal, the zinc would supply metal for all of the galvanic action, and the other metal would remain unscathed. This idea was so good that even today U. S. Navy vessels which must be as light and maneuverable as possible have tons of zinc *anodes* attached to their hull plating.

Special zinc anodes are made for small boats, in the form of plates, propeller-nut caps, and shaft sleeves, and are available from marine hardware stores. The zinc must be as pure as possible (less than .0014% iron content), and it must be attached or electrically connected to the metal which it is supposed to protect. It must not be painted, however, and when it has corroded badly (it will corrode, if it is providing any protection), the zinc anodes must be replaced.

A more modern method of protection is to supply a reverse current from a platinum anode fitted to the hull, powered by a battery-operated regulated supply. Although this is highly effective, it is somewhat more expensive.

The Scapegoat. Underwater metal comes apart for many more reasons than electrolysis and corrosion. Among these are abrasion from mud and sand, and cavitation.

At the time when comparatively little was known about the installation of electrical and electronic equipment on small boats, it was fashionable, and very easy, to blame every bit of underwater trouble on electrolysis. Radio had a bad name. Soberfaced "experts" actually claimed that the instant you installed a radiotelephone on a boat, the underwater hardware would start to fall off.

But since ghosts have gone out of vogue, don't tremble at the awful specter of electrolysis. Keep track of your electrical circuits so that current does not flow through the water; use sea-going metals and be sure they are properly mated; and use zinc anodes, if necessary. Take these basic protective measures, and you should have no trouble.

GALVANIC ACTIVITY OF BOAT METALS

When different electrically connected metals (listed below) are immersed in salt water, the metals closest to the base end corrode, and the ones closest to the noble end of the scale do not corrode.

BASE END

Magnesium
Zinc
Galvanized Steel or Iron
Aluminum (Pure)
Steel and Iron
Lead
Brasses
Copper
Bronzes, Everdur
Monel
Stainless Steel

NOBLE END

MANUFACTURERS OF MARINE ELECTRONIC EQUIPMENT

RADIOTELEPHONES

Aerosonic Marine, Inc., Hercules & Range Rd., Clearwater, Fla.
Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Bludworth Marine, 1500 Main Ave., Clifton, N. J.
Central Electronics Corp., 6013 Ackley Rd., Cleveland 29, Ohio
Gray Radio Co., Inc., 501 Forest Hill Blvd., W. Palm Beach, Fla.
Hudson American, 29-01 Borden Ave., Long Island City, New York.
Ray Jefferson, Inc., 40 E. Merrick Rd., Freeport, N. Y.
Kaar Engrg. Corp., 2995 Middlefield Rd., Palo Alto, Calif.
Micro-Lab Industries, Inc., 10 Clair St., Anderson, Ind.
Multi-Products Co., 21470 Coolidge Highway, Oak Park, Mich.
Munston Mfg. & Service, Inc., Beech St., Islip, N. Y.
George O'Day, 9 Newbury St., Boston 16, Mass.
Pearce Simpson, Inc., 2295 N.W. 14th St., Miami, Fla.
Radio Corp. of America, Building 15-1, Camden, N. J.
Raytheon Marine Products, 100 River St., Waltham, Mass.
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio
Schuttig-Atlantic, Box 1451, Annapolis, Md.
Sonar Radio Corp., 3050 W. 21st St., Brooklyn, N. Y.

RADIO DIRECTION FINDERS

Allen & Bradford, 3181 N. Elston Ave., Chicago, Ill.
Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Bludworth Marine, 1500 Main Ave., Clifton, N. J.
Cas Mfg. Co., 413 E. Hub, Mineral Wells, Texas
Guest Products Corp., 35-04 30th St., Long Island City, New York
Heath Company, Benton Harbor, Mich.
Ray Jefferson, Inc., 40 E. Merrick Rd., Freeport, N. Y.
Kaar Engrg. Corp., 2995 Middlefield Rd., Palo Alto, Calif.
Munston Mfg. & Service, Inc., Beech St., Islip, N. Y.
National Co., Inc., 61 Sherman St., Malden 48, Mass.
George O'Day, 9 Newbury St., Boston, Mass.
Radio Corp. of America, Building 15-1, Camden, N. J.
Raytheon Marine Products, 100 River St., Waltham, Mass.
Robinson & Co., Box 213, Gardena, Calif.
Sonar Radio Corp., 3050 W. 21st St., Brooklyn 24, N. Y.
Sperry Piedmont Co., Route 29, Charlottesville, Va.

DEPTH SOUNDERS

Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Bludworth Marine, 1500 Main Ave., Clifton, N. J.
Edo Corp., 13-10 111th St., College Pt., N. Y.
Jackson Electrical Instrument Co., 18 S. Patterson Blvd., Dayton, Ohio
Pearce Simpson, Inc., 2295 N.W. 14th St., Miami, Fla.
Radio Corp. of America, Building 15-1, Camden, N. J.
Raytheon Marine Products, 100 River St., Waltham, Mass.
Ross Laboratories, Inc., 124 Lakeside Ave., Seattle 22, Wash.
Sonar Radio Corp., 3050 W. 21st St., Brooklyn 24, N. Y.
Wilfrid O. White & Sons, Inc., 178 Atlantic Ave., Boston 10, Mass.

AUTOMATIC PILOTS

Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Belock Instrument Co., Marine Div., 11203 14th Ave., College Pt., N. Y.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Coweica, 1634 W. 14th St., Long Beach 13, Calif.
Hill-Cunningham, Los Angeles, Calif.
La Marche Sales Co., 49 Woodruff Ave., Wakefield, R. I.
Metal Marine Pilot, Inc., 342 Golden Gate Ave., Tacoma, Wash.
Richardson Controls Corp., 2563 Post Rd., Warwick, R. I.
Silva, Inc., 702 Ridgeway St., La Porte, Ind.
Sperry Piedmont Co., Route 29, Charlottesville, Va.
Ware Marine Products, Inc., 6763 S.W. 81st St., Miami 43, Fla.
Wilfrid O. White & Sons, Inc., 178 Atlantic Ave., Boston 10, Mass.

RADAR EQUIPMENT

Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Bludworth Marine, 1500 Main Ave., Clifton, N. J.
Chemalloy Electronics Corp., Gillespie Airport, Santee, Calif.
Decca Radar, 386 4th Ave., New York 16, N. Y.
Edo Corp., 13-10 111th St., College Pt., N. Y.
Lavoie Laboratories Corp., Inc., Matawan Freehold Rd., Morgansville, N. J.
Radio Corp. of America, Building 15-1, Camden, N. J.
Raytheon Marine Products, 100 River St., Waltham, Mass.
Sperry Piedmont Co., Route 29, Charlottesville, Va.

RADIO RECEIVING SETS

(Short-Wave and Marine Bands)

Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.

MANUFACTURERS OF MARINE ELECTRONIC EQUIPMENT

(Continued from the preceding page)

Burlington Electric Corp., Keim Blvd., Burlington, N. J.
Cas Mfg. Co., 413 E. Hub, Mineral Wells, Texas
Channelmaster, Inc., Ellenville, N. Y.
Kaar Engrg. Corp., 2995 Middlefield Rd., Palo Alto, Calif.
Machine & Supply Co., Drawer 391, Morehead City, N. C.
Micro-Lab Industries, 10 Clear St., Anderson, Ind.
National Co., Inc., 61 Sherman St., Malden 48, Mass.
Pearce Simpson, Inc., 2295 N.W. 14th St., Miami, Calif.
Radio Corp. of America, Building 15-1, Camden, N. J.
Robinson & Co., 731 W. 129th St., Gardena, Calif.
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio
James S. Spivey, Inc., 4908 Hampden Lane, Bethesda, Maryland.
Sturman Instrument Co., 2023 Ashland Ave., Baltimore, Maryland.
Vocaline Co. of America, Old Saybrook, Conn.
Zenith Radio Corp., 6001 W. Dickens Ave., Chicago, III.

RADIO ANTENNAS

Admiral Corp., 3800 Cortland St., Chicago, III.
Applied Electronics Co., Inc., 213 E. Grand Ave., S. San Francisco, Calif.
Bendix-Pacific, 8211 Lankershim Blvd., N. Hollywood, Calif.
Garelick Mfg. Co., 644 Second St., St. Paul Park, Minn.
Hudson American, 29-01 Borden Ave., Long Island City, New York
Instrument Associates, 351 Great Neck Rd., Great Neck, New York
Ray Jefferson, Inc., 40 E. Merrick Rd., Freeport, N. Y.
Kaar Engrg. Corp., 2995 Middlefield Rd., Palo Alto, Calif.
Master Mobile Mounts, Inc., 1306 Bond St., Los Angeles 15, Calif.
Morad Electronics Corp., 2434 1st Ave., S., Seattle 4, Wash.
Munston Mfg. & Service, Inc., Beech St., Islip, N. Y.
Pearce Simpson, Inc., 2295 N.W. 14th St., Miami, Calif.
Premax Products, College & Highland Aves., Niagara Falls, N. Y.
Radio Corp. of America, Building 15-1, Camden, N. J.
Raytheon Marine Products, 100 River St., Waltham, Mass.
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio
South West Electronics Co., 12629 W. Washington Blvd., Culver City, Calif.
James S. Spivey, Inc., 4908 Hampden Lane, Bethesda, Maryland
Sturman Instrument Co., 2023 Ashland Ave., Baltimore, Maryland
Vocaline Co. of America, Old Saybrook, Conn.
Washington Aluminum Co., Inc., Knecht Ave. & Pennsylvania R.R., Baltimore 29, Md.
Webster Mfg. Co., Inc., 242 Shoreline Highway, Mill Valley, Calif.

POWER MEGAPHONES

Antrex Corp., 856 N. Rockwell, Chicago 22, III.
Audio Equipment Co., 75 Harbor Rd., Port Washington, New York
Bell Products, St. Louis, Mo.
Guest Products Corp., 35-04 30th St., Long Island City, New York
Kaar Engrg. Corp., 2995 Middlefield Rd., Palo Alto, Calif.
Keenzales Enterprises, Inc., 6112 S. Grand Ave., Buena Park, Calif.
Merriman Brothers, Inc., Armory St., Boston 30, Mass.
Pye Corp. of America, 1149 Raritan Ave., Highland Park, New Jersey
Radio Corp. of America, Building 15-1, Camden, N. J.
Sound Craft Systems, 661 Rochester Rd., Pittsburgh, Pa.
South West Electronics, Inc., 12629 W. Washington Blvd., Culver City, Calif.
Sturrup, Inc., 50 Silver St., Middletown, Conn.

PORTABLE RADIO RECEIVERS

Admiral Corp., 3800 Cortland St., Chicago, III.
Andrea Radio Corp., 27-01 Ridge Plaza N., Long Island, New York
Antrex Corp., 856 N. Rockwell, Chicago 22, III.
Cas Mfg. Co., 413 E. Hub, Mineral Wells, Texas
Central Electronics Corp., 20168 Bonniebank Blvd., Rocky River, Ohio
Channelmaster, Inc., Ellenville, N. Y.
Heath Co., Benton Harbor, Mich.
Magnavox Co., Fort Wayne, Ind.
Motorola, Inc., 4545 W. Augusta Blvd., Chicago 51, III.
National Co., Inc., Sherman St., Malden 48, Mass.
Radio Corp. of America, Building 15-1, Camden, N. J.
Robinson & Co., 731 W. 129th St., Gardena, Calif.
South West Electronics, Inc., 12629 W. Washington Blvd., Culver City, Calif.
James S. Spivey, Inc., 4908 Hampden Lane, Bethesda, Maryland
Taylor Co., Inc., N. A., Gloversville 15, N. Y.
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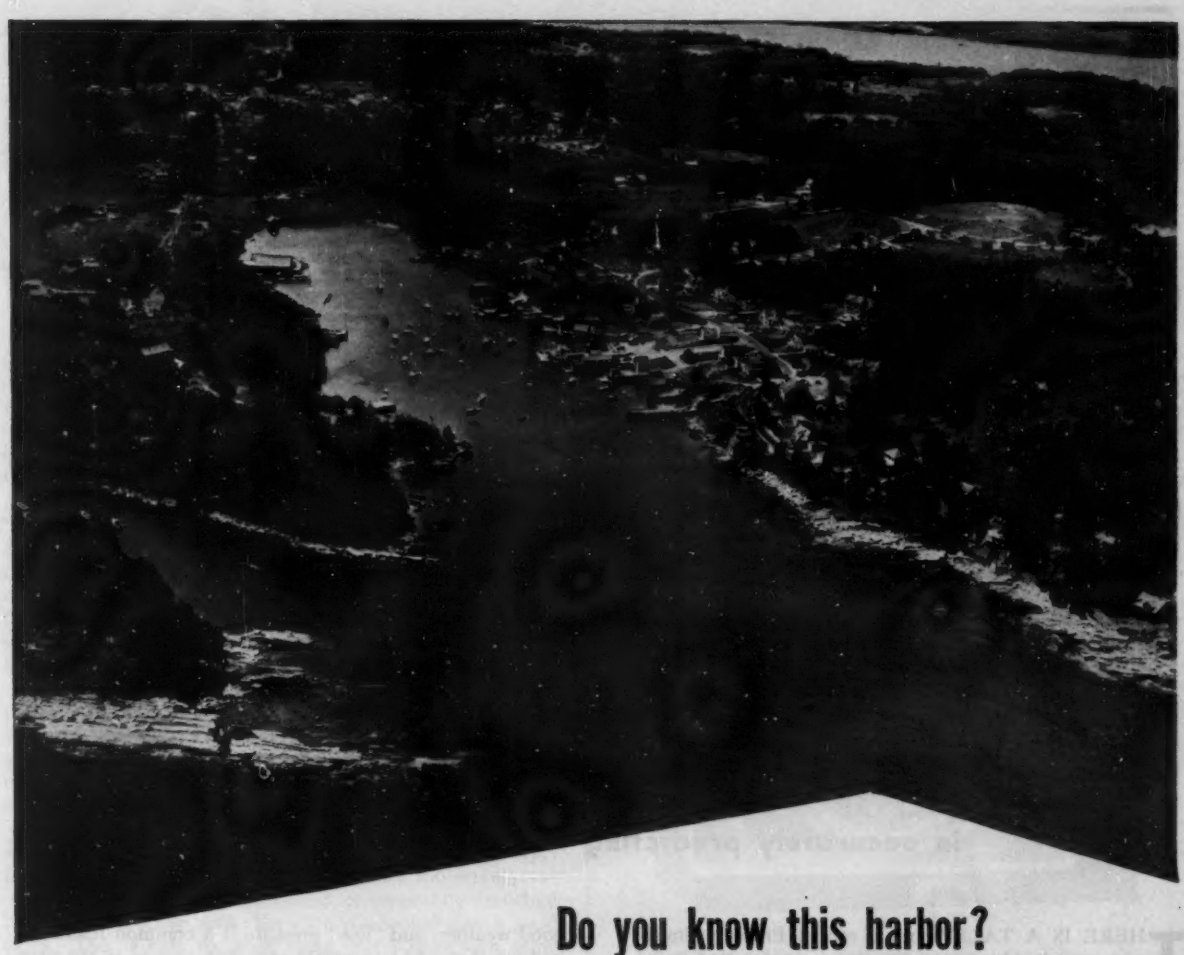
Chas. Engelhard, Inc., 850 Passaic, E. Newark, N. J.
Hallet Mfg. Co., 5910 Bowcraft St., Los Angeles 16, Calif.
Morad Electronics Corp., 2434 1st Ave., S., Seattle 4, Wash.
Pearce Simpson, Inc., 2295 N.W. 14th St., Miami, Calif.



Do you know this harbor?

This cove on the western shore of Muscongus Bay, about two and a half miles northeast of Pemaquid Point Light, offers a picturesque and interesting anchorage for boats drawing up to seven feet. It is sheltered from the sea, but open to the Bay, so a storm from the east can sometimes make it uncomfortable. In coming up the coast stay more than a quarter mile off shore and head for the lighted bell buoy off the entrance. The channel between the ledges is marked by a red nun on the southern end of the ledge that extends halfway across from the north side. Once inside, swing to the middle of the harbor and anchor anywhere beyond the daybeacon. At the wharves, on the north shore, fuel, water, fish, lobsters and a few supplies can be obtained. There are no facilities here for hauling boats but a mechanic is available for engine trouble. This is New Harbor, one of the few small Maine harbors that is still active in the fishing industry.

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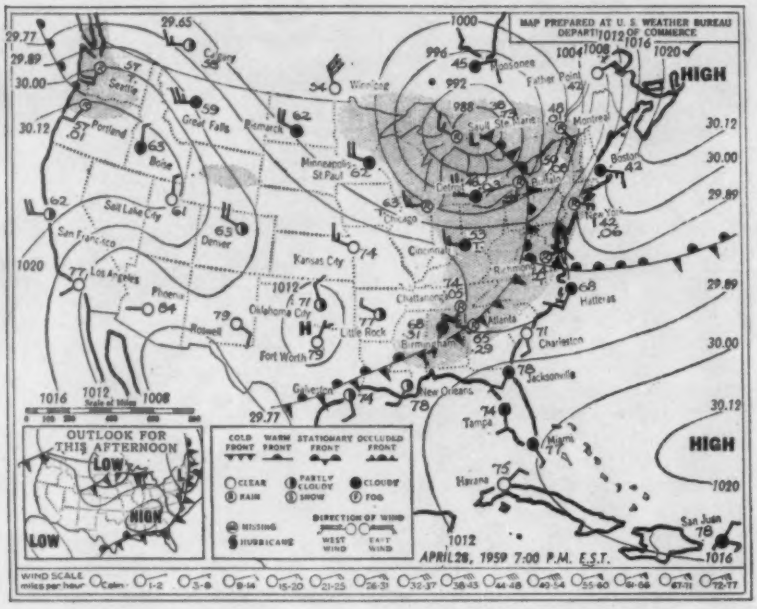

Curved lines on weather map are isobars along which barometric pressure is same. Note reading in inches at one end of line, millibars at other

By Nicholas Rosa

Properly used, your barometer is an invaluable aid in accurately predicting the weather to come

THERE IS A TALE about a retired English admiral who consulted his barometer on a rainy day, and found the pointer stubbornly indicating FAIR. He did what thousands of less distinguished barometer owners have wanted to do: he flung the thing out the window, shouting "There, you idiot! See for yourself!"

This was cruelly unjust, satisfying as it may have been at the moment. Nobody buys a barometer to see what the weather *is*. A barometer is a forecasting aid. All, alas, but a tiny percentage of the people who own one expect it to do the complete forecasting job. This is really asking too much of a simple machine.

A barometer's function is to measure the *atmospheric pressure*, and to show the pressure *tendency*, that is, whether it is rising or falling, and how fast. This latter is often more important for forecasting purposes than the pressure reading itself, at least as far as you are concerned.

The rest of the job requires a brain, and this is where you, presumably, come in. A good skipper knows his weather. He knows clouds and winds, and not just from proverbs. He knows about the *why* of clouds and winds, of temperature and humidity; he has a good understanding of air masses and fronts, high- and low-pressure systems, how they form, and how they move over land and sea.

He knows and understands any weather instruments he owns: how they work and what their readings mean, and that brings us right back to the barometer.

The first thing to get firmly in mind is that the words RAIN, CHANGE, FAIR, and their ilk, seen on most barometer faces, are only decorations. For both manufacturer and proud owner, they identify the gadget as a weather instrument, but that's about all. On a barometer built to Navy or Weather Bureau specifications, the face is perfectly noncommittal. About the only word on it is the manufacturer's name, in meek-sized letters.

It is generally true that "high" pressure accompanies good weather, and "low" pressure is a common feature of bad weather. As you would expect, a change in the pressure can herald a change in the weather—but not always. (There is a "routine" daily change you should know about: we'll get to that.)

"High" and "low" pressure are really relative terms, anyway. The entire pressure pattern across a continent may be on the "low" side, as barometer readings go, but any "mound" in it will be called a "high." Likewise any "saucer" or depression in a pressure pattern will be labeled a "low."

Bad weather may or may not be associated with a "low." The low may exist because of heating, and be the result of sunny weather. To add to the confusion, cloudy or rainy weather can occur inside a nominal "high" when warm, moisture-laden air rides in over the top of the cool high-pressure "bubble." Air cools as it rises, and there is cooling at the interface between warm and cool air masses. Eventually the warm air cools to the point where its moisture condenses into droplets and then drops—clouds and rain.

Actually, the change in pressure from good to bad weather, from clear high to stormy low, is usually very small. As you have been told countless times, atmospheric pressure is about 14.7 pounds per square inch (at sea level!) and it is really "about" that practically all the time.

A printed word like FAIR takes up quite a bit of room on a barometer dial and may sprawl over a pressure range in which rain frequently occurs in your area. The word RAIN usually appears at pressures found only in the eyes of hurricanes, and there, the weather is likely to be sunny and calm, with the storm ranging all around.

All this isn't intended to discourage you, but only to help you make some sense out of your barometer readings. There is a pattern to the usual cyclone or low-pressure disturbance (or just plain "storm") that sweeps across the

United States, which makes it possible to work out handy forecasting aids like *wind-barometer tables*. Such a table may have come with your barometer. Just remember that these tables do not take the place of common sense and a good knowledge of the weather any more than the barometer alone does.

Your barometer is probably of the *aneroid* type, which is a lot more convenient for a boat, or even a living room, than the classical mercury-in-glass type. (If you have been sold a shark-oil glass or like toy, we'll have to part company here.)

The heart of the aneroid barometer is a small, flat metal cylinder, and spring. Most of the air is removed from the cylinder and it is sealed. Increasing atmospheric pressure pushes the cylinder faces inward. The spring moves them outward again when the pressure falls. A lever-and-pulley system couples a pointer to one of the faces, and magnifies its sweep across the dial with the tiny expansions and contractions of the cylinder. Adjustment is by a setting screw that changes the loading on the spring.

Because the changes in atmospheric pressure in terms of "pounds per square inch" are so small, they have traditionally been expressed in terms of the *height* of the mercury column in the old-time or standard "glass." Your aneroid barometer dial is calibrated in "inches" still, even though it has no mercury. The inches are read to *hundredths*, but very cheap barometers are marked only to tenths and the hundredths must be roughly estimated.

Years ago, official weather services adopted an international standard, the *bar*, which expresses atmospheric pressures directly. Pressures are read to *millibars* (thousandths of a bar) and *tenths* of a millibar. Professional-model barometers often carry both inch and millibar scales, as do other quality models, though not all.

The aneroid barometer is more compact, more convenient, and more rugged than the mercury-in-glass type, but it should not be dropped onto the deck too often. Nor should it be submerged or splashed, or frequently drenched by salt spray. Give yours the care you would give a good clock. This is only common sense, but I have seen some sadly bedraggled barometers come off boats.

When first delivered, a barometer should be *set* to give a true or useful reading. Misunderstanding of the manufacturer's instructions seems to be epidemic among all ages, educational levels, and occupations, especially when it comes to the part about "correcting to sea level" (we'll get to that). Yet it's all really very simple, even if some manufacturers' leaflets read like rough translations from the Martian.

Your barometer has two pointers: one, usually black, connected to the "works," and the other, usually gold, controlled by a little knurled knob outside the glass dial-cover.

"Setting" refers to the black pointer, of course. The setting screw is behind a small hole in the back of the case and is easily distinguished from the assembly screws.

Before you insert your screwdriver you have to know what the barometer should read, and the best thing to do is to telephone the nearest weather station (Weather Bureau, airport, college, military, etc.). If there is none nearby—as near, say, as the next town—there is another procedure, outlined a few paragraphs below.

Ask the observer for his latest *sea level pressure* in inches. If you set your barometer to agree with it exactly you can forget all about the maddening business in the manufacturer's folder about correcting to sea level. If you make the call on a calm day you can probably ignore such unknowns as the difference in local pressure caused by the ever-changing pressure pattern. (Wind is air flowing down a pressure gradiant. The lighter the wind, the "flatter" the pressure pattern, as a rule.) Weather stations now take their observations on the hour; if you call 15 minutes later, the observer will have completed his readings and gotten them onto the teletype and will have a moment for you.

BAROMETER continued on next page

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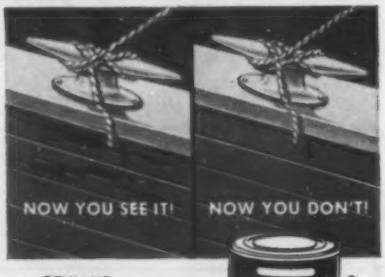

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BAROMETER continued

He will advise you if the pressure is rising or falling so fast that the 15-minute lag makes a difference. Try to be brief, even in your thanks, but don't be afraid to ask necessary questions.

Turn that setting screw gently, a little at a time, holding the barometer upright, until the pointer reaches the desired reading. Check on your progress every twist or two, still holding the instrument upright and tapping its face lightly with your finger before reading. You are going to do this every time you read it anyway: a barometer's innards are just a little sluggish and need the tap to prevent sticking.

Of course you will turn that screw so that the pointer approaches the reading directly, no long 'way round. This advice may seem insulting, but I have supervised all this by telephone hundreds of times, and oh, brother! Yes, if you turn it too far the wrong way, you may damage the mechanism.

A typical pressure reading from the weather station might be "thirty point one five inches," or "thirty and fifteen hundredths" (30.15″). Cheaper models are often exasperating about settling down on the last few hundreds, but get as close as you can, and tuck the difference or "error" in your memory.

If you live so far from a weather station that telephone charges make you flinch, or become "long distance" rates, this is for you: the U. S. Weather Bureau can supply free forms on which you will record your barometer readings over a series of days, and mail them back. The Bureau will study your log and recommend a correction. You will reset your barometer by that much; again, sea-level correction (which is really the *altitude* correction for your location, as pressure decreases with height) will take care of itself. The Bureau's Washington, D. C., headquarters can supply forms and refer you to the nearest local office.

Don't take your instrument to a weather station for the setting, which will only change with altitude differences, etc., as you return home. Please don't ask the staff of a weather station to repair a malfunctioning or "fallen" barometer. They are weathermen, not instrument makers, and already have plenty of work to do. If it needs repairs, write to the manufacturer or import agent for instructions. (Don't just ship it, especially not by air!)

Although any aneroid barometer worthy of the name has a built-in temperature compensating element (because the cylinder expands and contracts with temperature, changes, too) it should not be mounted where temperatures go to extremes or change rapidly or suddenly. In your house, an inside wall of your living room, where *you* would hang comfortably, is best. On your boat, find a corresponding place, preferably shielded from direct sunlight.

Mount it there at a convenient eye level. It is designed to work upright, not lying flat. Face it head-on while reading, and close one eye if necessary. Don't read it from "side angles."

Tap it gently before each reading, and then cover the black pointer with the gold one (at last you can twiddle that little knob!). Later, when you read it again, the black pointer will probably have moved out from under the gold. Divide the amount it has moved by the number of hours between readings, and you have the *tendency*. (A convenient "time base" is 3 hours, which is used officially, even with hourly "ob's.")

A falling tendency of one hundredth of an inch per hour is usually no cause for concern, but a fall of two hundredths or more per hour is "rapid" and can mean bad weather coming. Conversely a rapid rise during bad weather can signal that clearing is at hand: watch for a wind shift, too.

By the way, pressure rises and falls not only "rapidly" and "slowly" but also "steadily" and "unsteadily." It may remain "steady" and change little, if at all, for hours. A steady barometer can be ominous as well as benign, so look for other signs, in the clouds, winds, and weather map.

There is a daily or *diurnal* rise and fall of the barometer that you should keep in mind whenever reading it. This tidal effect in the atmosphere is often marked by bigger changes caused by moving weather system, but it is really always there. The amount of diurnal "swing" in U. S. latitudes is normally very small and varies from season to season, but the pressure tends to be highest near 10 a.m. and 10 p.m., lowest near 4 p.m. and 4 a.m.

During any given season you may notice that precipitation *usually* occurs with the barometer very near certain readings. This may help you predict the time rain will begin but is not completely dependable. Nor is it any help in predicting the arrival time of cold-front or occluded-front squalls. The "rain reading" peculiar to your locality varies from season to season or year to year, but you can learn to spot it and make use of it.

Check your barometer against the weather station's at the start of each boating season, when you install it on your boat. Check it every few months if you make serious use of it between seasons. In fact, you ought to persuade your local yacht club or marina to check *their* barometer against the weather station's for you; the advantages to all concerned are obvious.

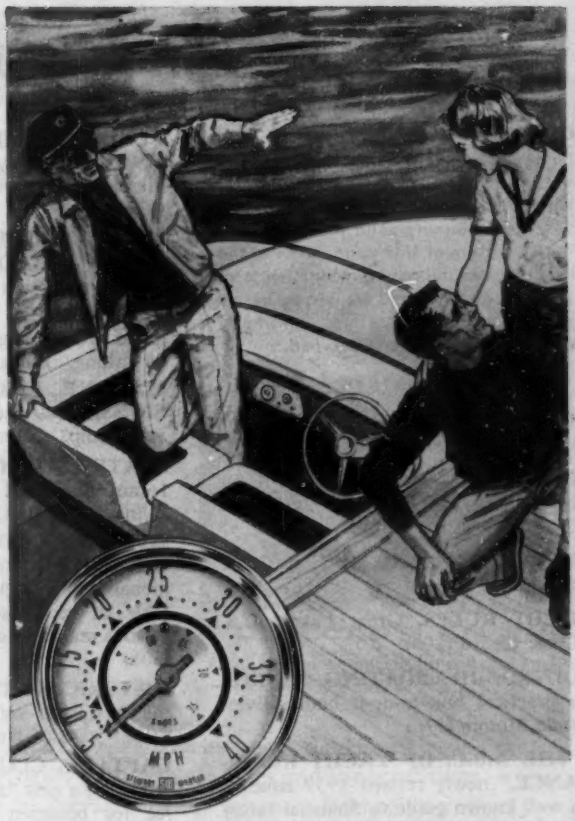
Ideally the barometer should be carried to the boat a day or two before setting. Don't make it "commute" daily or weekly between home and boat. There is no room here to discuss *elastic error* in aneroid mechanisms, but this "error" is one reason why your instrument needs a chance to settle down, and a resetting, whenever "transplanted."

A quick-and-dirty correction, if you know the altitude difference between your home and your boat (No! the weather station won't know it, either!) and *if* they are fairly close together, is 0.11 inches per hundred feet of altitude, *added* when you go up, *subtracted* when you go down the hill, provided the instrument is reasonably correct to begin with. The correction is proportional for fractions of 100 feet. As with any other correction to an aneroid, you set it into the instrument and forget it—except for those last few hundredths on the cheap ones.

To develop a true picture of the pressure pattern on weather maps, weathermen must have all altitude effects canceled out, which is the reason for the sea-level correction. At any location, whether on Mt. Washington or at the bottom of Death Valley, on Lake Mead or Cape Cod Bay, a barometer must read "what it would read" if it could be at sea level at that spot. If you are using weather maps (and you should!) or are following radio weather analyses, a correct barometer will help you know "where you are" in relation to the moving center of a storm, which, to understate, is a good thing to know. Out cruising, where reliable synoptic or "overall" weather information is hard to come by, the local cloud patterns, winds, and barometer *tendency* will be your guides.

In buying a barometer, spend as much as you can afford. If you can spend twenty dollars or more, so much the better. If you can spend only ten dollars or less, buy carefully, and try not to spend too much less. Buy as big a metal-cased type as you can find, with a big dial and big "works." Avoid the tiny barometer in the large wooden plaque and the ship's-wheel spokes and other gimcracks. But don't fear the RAIN CHANGE FAIR decoration: even very fine and expensive models are cursed with it. Shun combinations of barometer-thermometer-hygrometer. You will not really be getting three instruments for the price of one. Whatever you spend, buy as businesslike an instrument as you can.

As you practice with your barometer, keep your eye on the cloud patterns and wind changes, too. Study up on weather generally, and keep observing just what happens as your barometer needle creeps from one reading to another. In time your once-enigmatic "brass box" will become a steadfast and informative friend, and your boating and safety will have increased many times over.— ⚓



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WATER SKI SELECTION CHART, for picking the right type of ski according to horse-power, weight of skier, and purpose. White Bear Co. (319)

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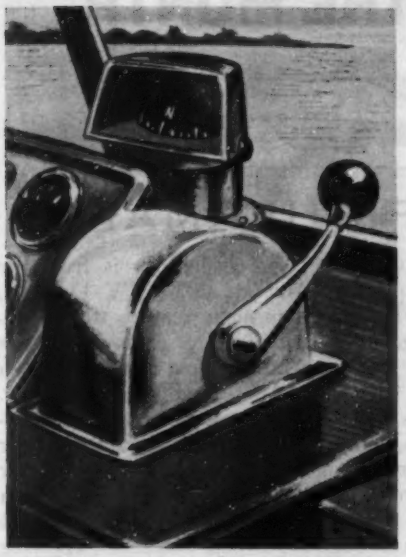

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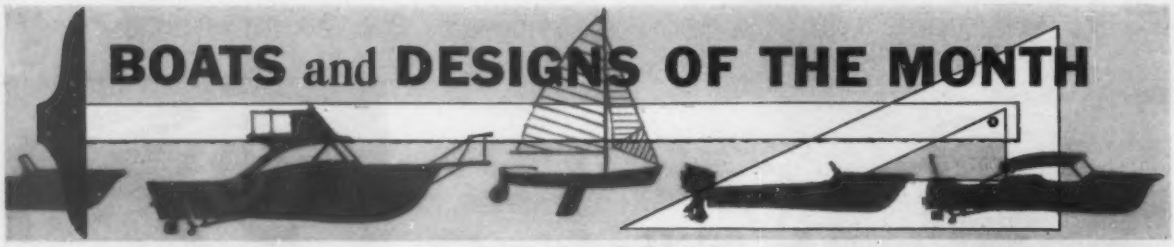
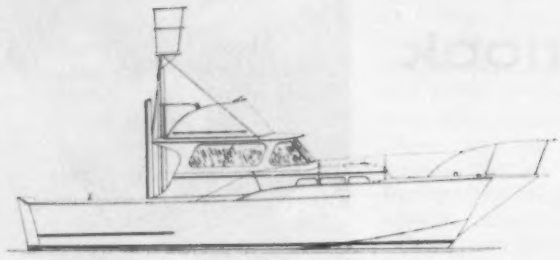


BOATS and DESIGNS OF THE MONTH

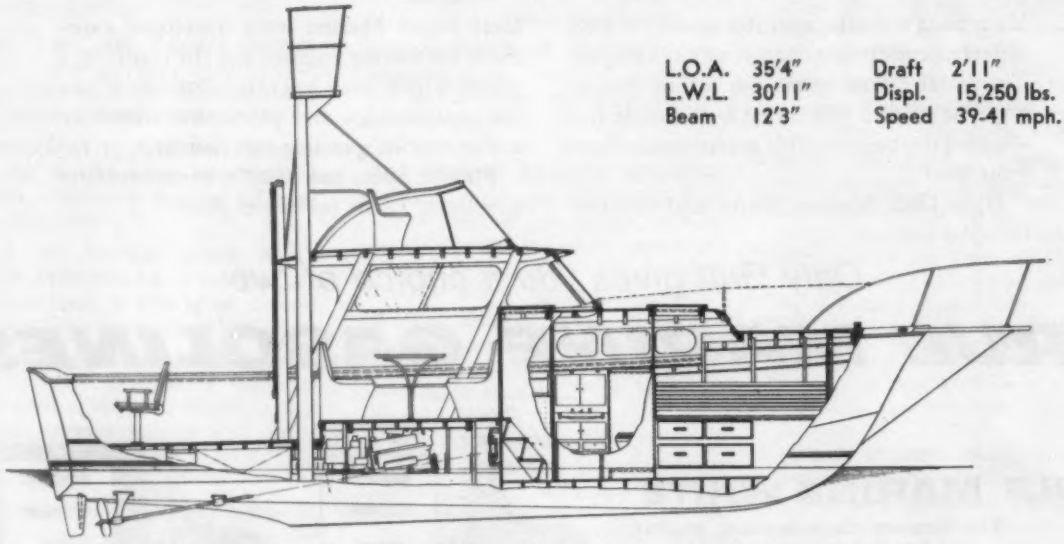
NEW CUSTOM SPORTSFISHERMAN



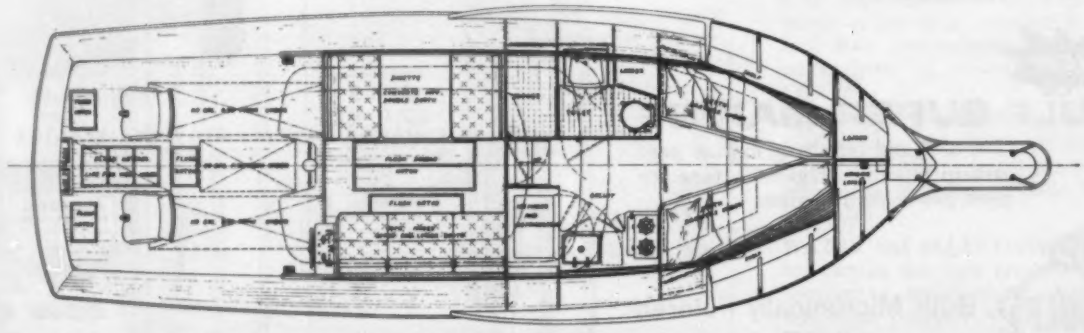
The new 35 footer shows pleasing lines and, despite the superstructure necessary for fishing, keeps the weights low for good stability in beam seas.

THIS NEW 35 foot sportsfisherman is from the board of Peter Guerke, 2050 NW 11th St., Miami, Fla. and offers many features that experienced game fishermen prefer. Although she is primarily a fishing boat, ample room has been provided for living aboard and family cruising. Generous flare in the bow sections, spray deflector chines, and flat after buttocks should make for a fast, dry riding craft. The designer plans for speeds from 39 to 41 mph when powered with two 275 HP Universal V8 engines—turning at 3600 rpm through 1½-1 reduction gears. The skeg is slightly shorter than usual for maneuverability when boating hooked fish, but is large enough for directional stability when docking.

L.O.A.	35'4"	Draft	2'11"
L.W.L.	30'11"	Displ.	15,250 lbs.
Beam	12'3"	Speed	39-41 mph.

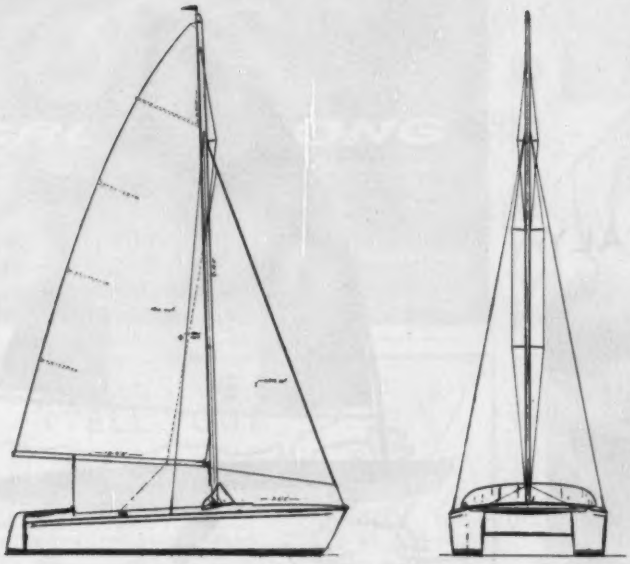


Her cabin is light and airy. An auxiliary set of controls are operated from the bridge.



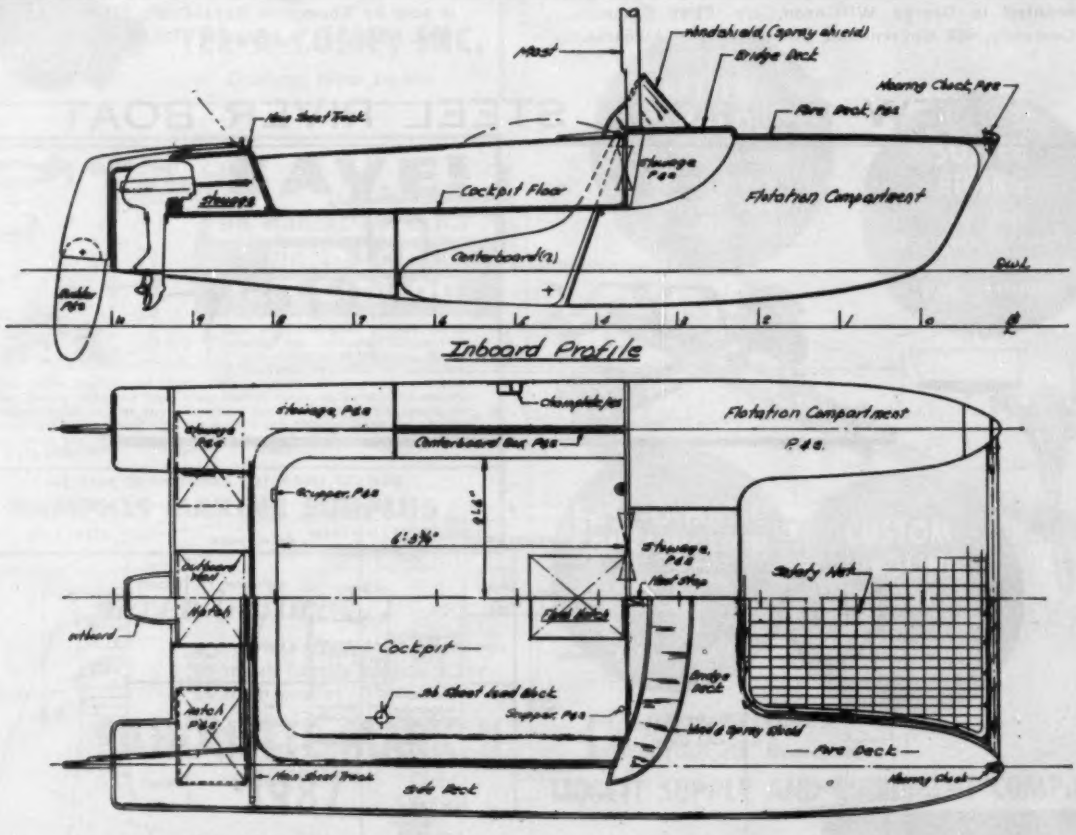
The new sportsfisherman sleeps six comfortably. Toilet room is enclosed and has a shower. Galley is equipped with a two burner stove and Revco Icemaker Refrigerator of 7.3 cu ft. capacity. A live bait well and live fish well aft are supplied with circulating sea water. A third set of controls can be led to the tuna tower through the lightweight aluminum mast. Side decks are extra wide for fast access to pulpit.

NEW STOCK FIBERGLASS CATAMARAN



Kalua has a high aspect ratio sail plan, carries 160 sq. ft. of sail, and a highly tuned staying arrangement. Windshield protects passengers.

A FIBERGLASS CATAMARAN, that is adaptable to family sailing, and features safety, and minimum maintenance, plus an exhilarating turn of speed, is the Kalua, which was created by noted "cat" designer, Robert B. Harris, of Greatneck, L.I. Harris also designed the "Tiger Cat" which was overall winner of this year's *Yachting* magazine One-of-A-Kind Regatta at Miami. The Kalua has a roomy cockpit, and a safety netting between the twin hulls in the bow to provide added deck area. The twin hulls are of fiberglass reinforced plastic construction with colors molded into the resin. Kalua has a hollow aluminum aerodynamic mast which can be readily unstepped if the craft is to be used as an outboard. Under either power or sail, she is very fast, and with a large HP motor will tow water skiers. Kalua is sold by Dolphin Laminates, Box 4694, Miami Beach, Florida.



The cockpit of the Kalua is roomy enough to accommodate several air mattresses for sleeping aboard when overnighting, and an awning may be rigged over the main boom. Generous stowage for gear is provided in the port and starboard hulls, and an outboard well with hatch cover lies amidships. The new catamaran has twin centerboards and rudders in each hull, and flotation compartments port and starboard forward. The cockpit is self-bailing. Her principal dimensions are 16 ft. overall, 14 ft. 7 in. waterline, and 7 ft. 9 in. beam.

BOATS and DESIGNS OF THE MONTH

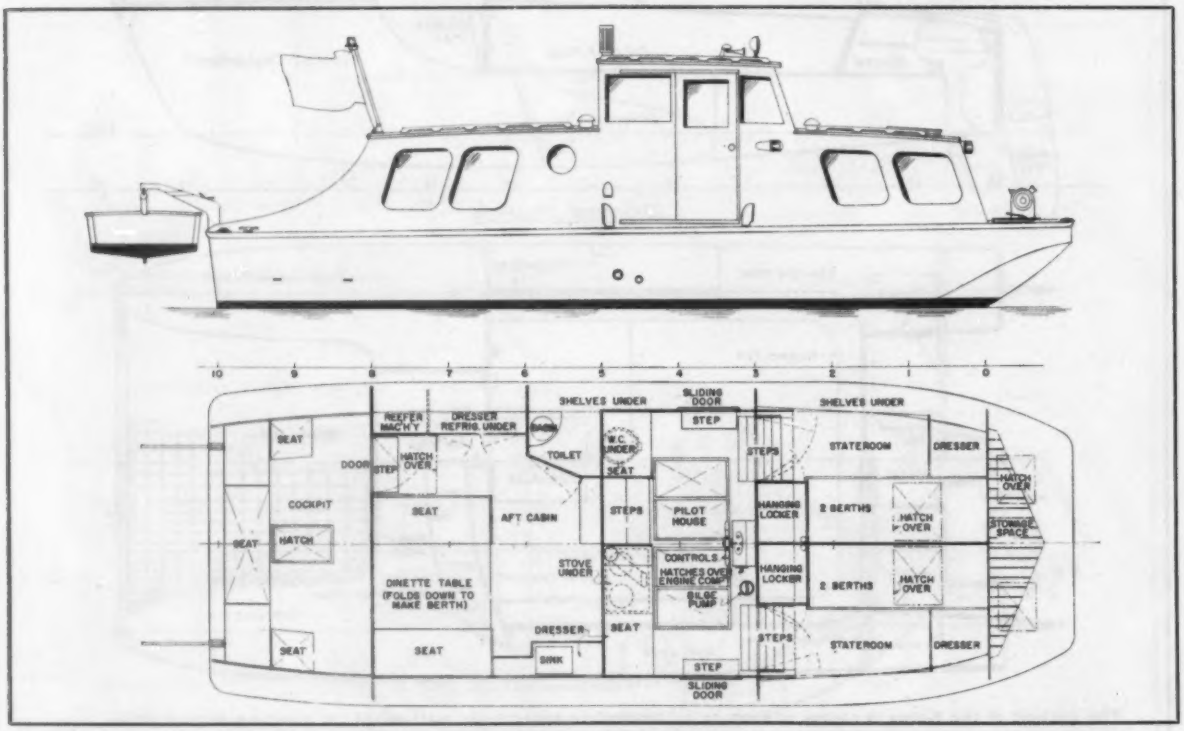
ROYALITE SAILING SURFBOARD

Beachcomber is an 11' 10" sailing surfboard of the type that has become so popular for sheltered waters. Her hull is of new U. S. Rubber Royalite, which is claimed to be practically maintenance free. The craft is sold by Thompson Royal-Craft, 126 Elm St., Cortland, N. Y. She is priced at $425.00 with Dacron sail.

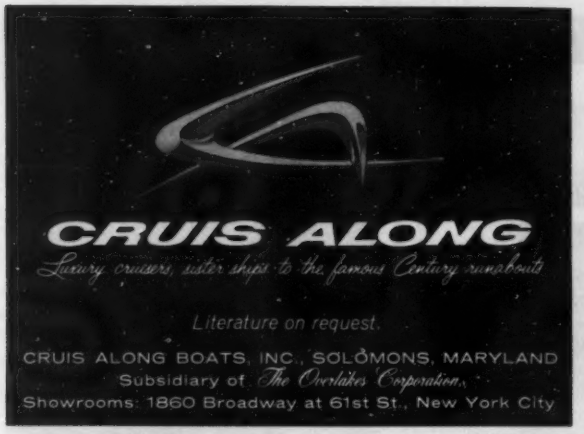
RUNABOUT FROM ITALY

The Florida, above, is a high speed luxury runabout designed and built in Italy by Riva, especially for American requirements. She attains speeds of 42 mph with a 175 HP Chris-Craft engine. Distributor in this country is George Wilkinson, c/o First Finance Company, 458 Government Street, Mobile, Alabama.

NEW 30 FOOT STEEL RIVER BOAT



An interesting new craft designed for cruising rivers, lakes, and sheltered bays with space enough for comfortable living aboard, is this 30 foot cruiser from the board of Robert L. McMurray, of 427 Marin Ave., Mill Valley, California. The hull of the river boat is 12 gauge welded steel shell plating with four watertight bulkheads. A pram bow facilitates beaching, and a tunnel stern reduces draft and protects the propeller from damage. With a Universal Explorer 95 HP engine and a 2:1 reduction gear, she will cruise at 10 mph for a range of 500 miles.



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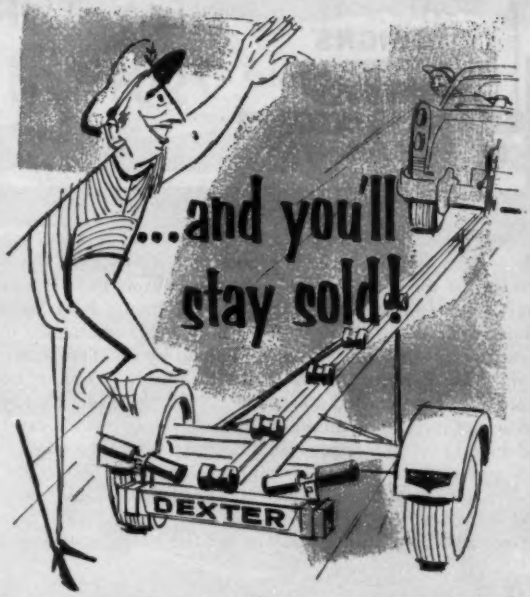

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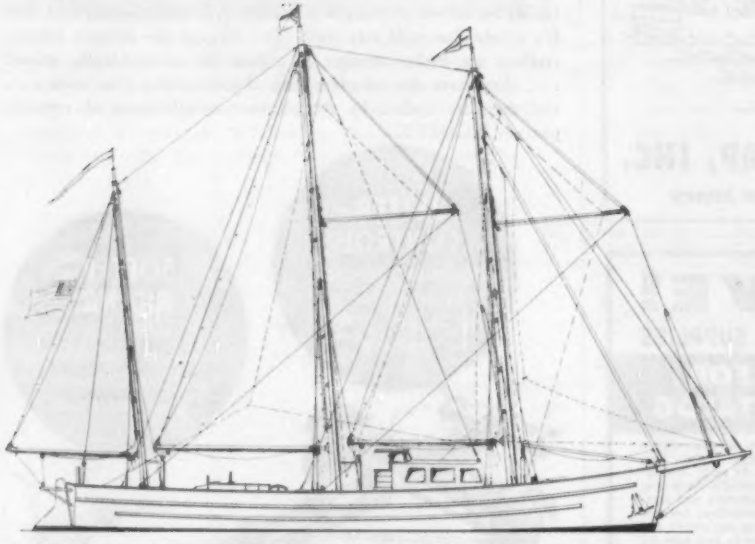
DEXTER Ready-Rig BOAT TRAILERS

BOATS and DESIGNS OF THE MONTH

NEW THREE MASTED SCHOONER

AN INTERESTING and unusual new yacht that will soon be seen cruising eastern waters, is the 99 foot *Rara Avis* which was designed by Philip Rhodes for the well known yachtsman, Capt. Paul Hammond, USNR Ret. The Captain, an admirer of the historic Thames River sailing barges of England, had *Rara Avis* built to lines that are reminiscent of those famous craft. Construction was undertaken in Holland by the Terneuzen Shipbuilding Co., to rigid U. S. Bureau of Shipping standards. Captain Hammond's boat is rigged as a three-masted marconi schooner, with sails that brail in to the masts and do not have to be raised or lowered. Square yards can be sent up the fore and main to set squaresails when running before the wind. Her hull is welded alloy steel with double-bottomed tanks and three watertight bulkheads. Twin tandem steel centerboards provide weatherliness and aid in trimming. The new character boat will fly the burgees of the New York and Seawanhaka Corinthian Yacht Clubs, and she will be based at Oyster Bay, Long Island.

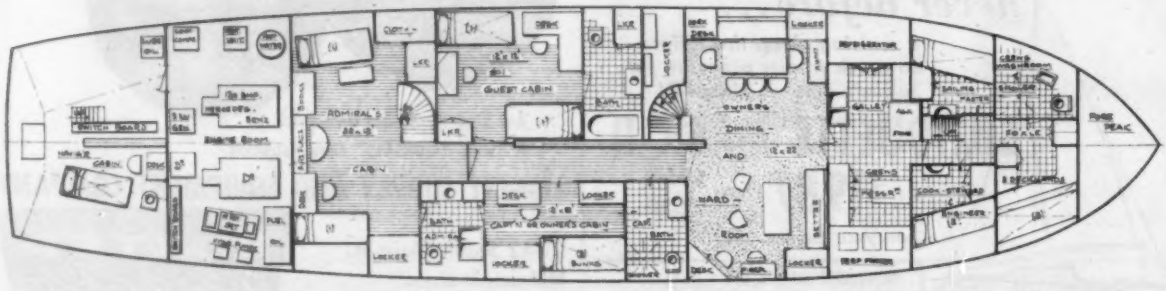
At her builder's trials, Rara Avis floats right on her marks, and is a beautiful sight with flags flying.



Despite her large 3500 sq. ft. sail area, the new schooner requires only four hands to run her. Bermudan sails brail in, and staysail and genoa are fitted with roller reefing gear and furl around stays.

Long, sturdy, and able to go anywhere, her rig combines great area and the ease of handling that functional simplicity gives.

L.O.A. 99' L.W.L. 94'6" Beam 23' Draft 4' Sail Area 3500 Sq. Ft.



Quarters aboard Rara Avis are well thought out and luxurious. Twin Mercedes Benz 120 HP diesels provide an easy 10 knots. A separate cabin aft with a desk, is provided for the navigator. Cruising range with full tanks is 4,000 miles, and 2,000 gals. of fresh water are carried aboard. Sails are tanned flax made by Ratsey and Lapthorn of Isle of Wight, Cowes. A 17 ft. Herreshoff sailing dink and a 14 footer are used as tenders.

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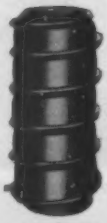

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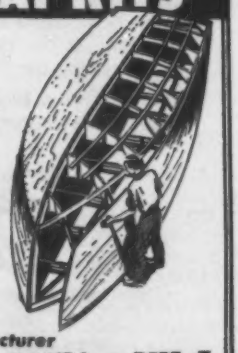

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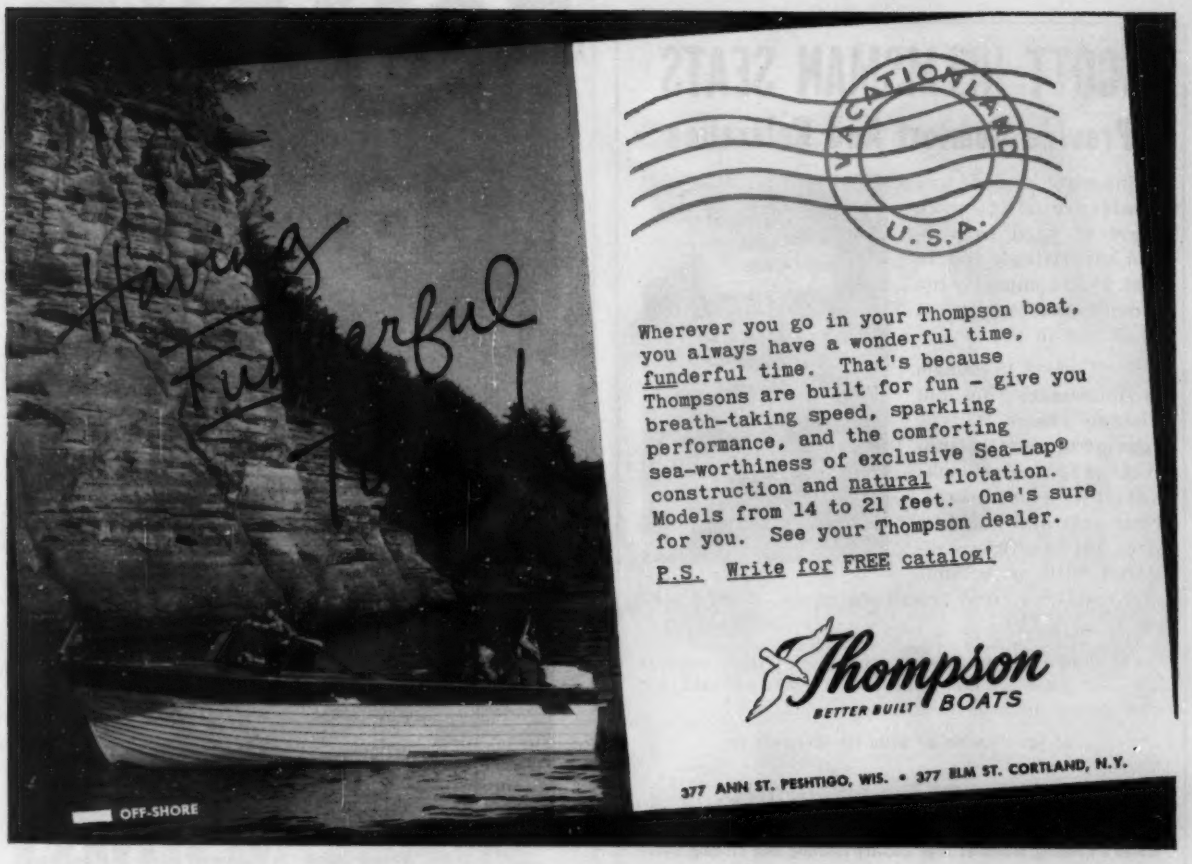
FIBERGLASS OUTBOARD

The Nylox Adventurer, above, is a 15 foot fiberglass outboard that is intended to take large horsepower motors for the high speeds necessary in water skiing. She is built by the Nylox Corporation, Arcadia, Calif.



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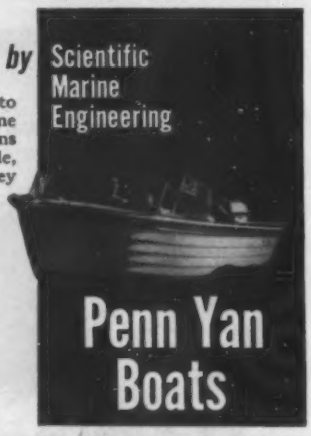

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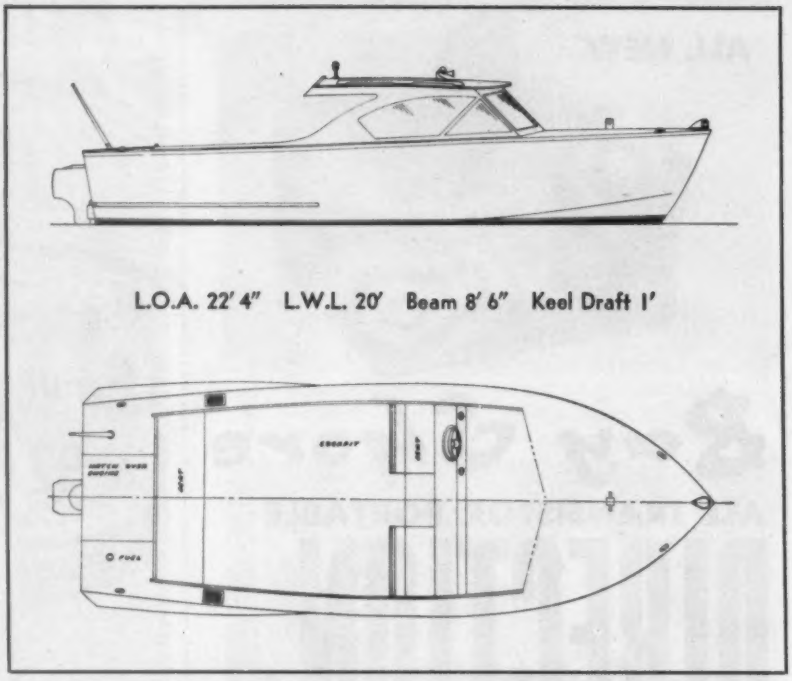

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PART V

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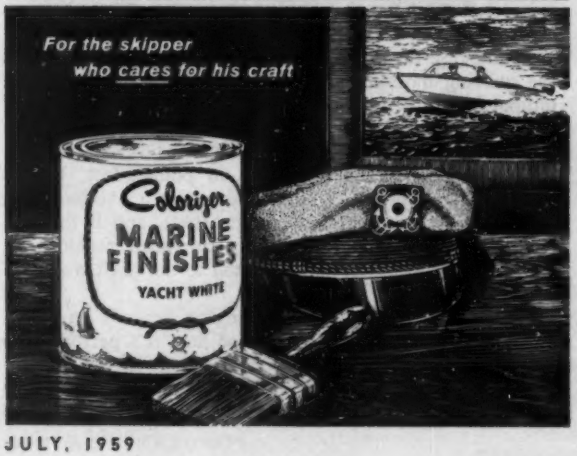
By Hank Wieand Bowman

IN THE LAST CHAPTER, I discussed some of the major factors that have an effect on outboard engine performance. Though it may seem that the same set of factors would apply to any marine engine, outboard or inboard, two-cycle or four-cycle, this is not wholly true.

One of the basic reasons for this lies in the variance of initial design of the engines. Outboard engines are designed to operate near or at peak rpm for extended periods of time. This means that all bearing surfaces and other components subject to friction and thrust of reciprocating parts have been built to withstand continuous high-rpm use.

The inboard engine commonly used today is little different in components and inherent makeup from the type of powerplant used in automobiles. Indeed, most marine

SPEED continued on next page



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SPEED continued

inboard gasoline engines are basically automotive engines with certain minor modifications. While an auto engine is designed and built to develop its maximum horsepower at a certain rpm, it is not designed to be operated continuously at maximum power. For example, an engine designed to produce 200 hp at 3600 rpm will normally be operated in a speed range not in excess of 55 to 60 mph. To develop full power, it would have to be operated flat out at full throttle, something normally reserved for race tracks.

When the automotive type power plant is modified for marine use, the internal components are changed only modestly, if at all. Major changes include use of different exhaust manifolds (which for marine use are water-cooled); a different water pump; a marine type transmission with or without reduction gears, in place of the auto transmission; a change in placement and design of oil sump, and carburetion changes. Generally, nothing is done to the marine engine to permit it to be operated at its full potential rpm for any longer periods of time than could have been expected of the similar power plant in the automobile.

The inboard owner, in his search for greater engine efficiency, should come to know the meaning of the term

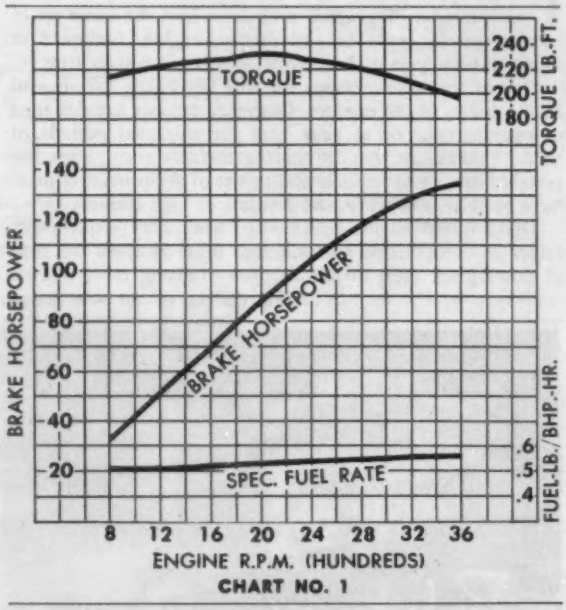

CHART NO. 1

torque, and its effects as concerns horsepower, engine rpm, propeller selection and fuel economy. Webster defines *torque* as "that which produces or tends to produce rotation or torsion . . . the turning motion of a tangential effort." A tangential effort is nothing more than an arc. So torque is in effect the force that tends to twist something about an axis of rotation.

In the case of the boat, the torque we're interested in is the twisting motion, imparted to the propeller shaft and ultimately to the propeller. Propeller torque can be figured in pounds-feet by dividing the rotating speed of the shaft by brake horsepower multiplied by the factor 5250.

Torque is correctly expressed in pounds-feet. If you were to take a propeller shaft and secure a one-foot long rod horizontally to the axis of the shaft, and if this rod were to be weighted to exert a downward pull of one pound, the twisting motion imparted to the shaft would be one pound-foot.

Horsepower developed in an engine depends on piston displacement and rpm. Reproduced here is a performance chart for a 265 cu. ft. piston displacement engine that develops 135 hp at 3600 rpm. Note that this motor's torque peak of approximately 230 pounds-feet is reached at 2000

rpm. However, this torque figure applies only to a direct-drive installation. If we were to fit this engine in a boat and equip it with direct drive and a propeller which would allow the engine to reach its peak of 3600 rpm, it would in fact develop the brake horsepower indicated and have a torque-rpm curve closely approximating the one reproduced.

To illustrate this, let's select a theoretical engine rpm of 1600. At this point, according to the hp curve, the engine develops approximately 70 hp. Applying the torque formula, we multiply horsepower times the factor 5250 and divide by the rpm. That gives us 70x5250=367,500÷1600 =229 plus pounds-feet of torque.

However, if we were to equip the same boat with a 2:1 reduction gear, this would mean that our propeller would rotate at one-half engine rpm. Applying the torque formula again, we would divide 800 (half of 1600 rpm) into 367,500, and we find that our torque is 459 plus pounds-feet. We have maintained the same engine speed, we are developing the same horsepower, and yet we have doubled the torque at the prop shaft. There's nothing magical about this. Multiple pulleys can increase the pull on a single line many times over.

As I have pointed out before in this series, maximum speed can be accomplished with any boat design and given horsepower only at the sacrifice of other equally attractive characteristics. For example, maximum speed will only be gained at maximum fuel cost for your particular power plant. Keep in mind that with an inboard engine, horsepower developed will be in a ratio of pounds of fuel consumed in any given period of time. The more fuel consumed (without waste), the greater will be the developed horsepower, *but not necessarily the greater speed.*

If, for example, you equipped a 32-foot inboard cruiser weighing 10,000 lbs. with a wholly unsuited propeller of 9-inch diameter and 9-inch pitch, the engine would reach peak rpm with ease. Yet the forward motion of your boat could not be anything but a disappointment to you. It would be similar to equipping a Thunderbird or Corvette with 10-inch wheels. Even if this boat were equipped with a well-chosen propeller, that propeller would be most efficient *only at the rpm for which it was selected.*

For every boat there is a most desirable shaft speed which has a direct relationship to boat speed. Fast, lightweight boats such as runabouts perform best with direct drive engines, as a lesser amount of torque will push them onto plane. Cruisers do better with some sort of reduction gear drive; the heavier the boat, the higher the drive-gear ratio. Watch the slow rotation of a freighter's propeller some time. The great torque easily swings the huge propeller required to push the ship. Thus high torque is needed to push heavy loads, and propeller shaft speed determines proper propeller diameter. If an engine's rpm must be too high in order to attain suitable shaft speed for a certain propeller size, it then becomes obvious that an overly-small propeller has been used.

On a heavy boat in which no reduction gear is used, the owner should fit a propeller which at full throttle will permit the engine to wind out to an rpm that matches the peak of the torque curve. This will seldom be maximum engine rpm for top horsepower. This, however, would merely be a half-way measure since only a part of the engine's potential power could ever be utilized. The ideal situation is for the owner to allow the engine to develop its full horsepower at full throttle, and by means of a properly selected reduction gear, swing a propeller which offers the most efficient speed at a safe cruising rpm.

During tests for the selection of a propeller to go with the 265 cu. in. engine whose performance curves are reproduced, three wheels were tried. This engine was fitted in a 24-foot skiff weighing approximately 4000 lbs. The three propellers tried were: a 14-inch diameter by 11-inch pitch, a 14-inch by 9-inch, and a 13-inch by 10-inch. These were all educated guesses based on previous experience.

TEST continued on next page

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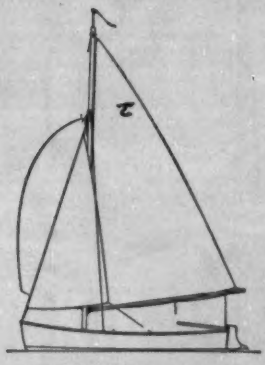

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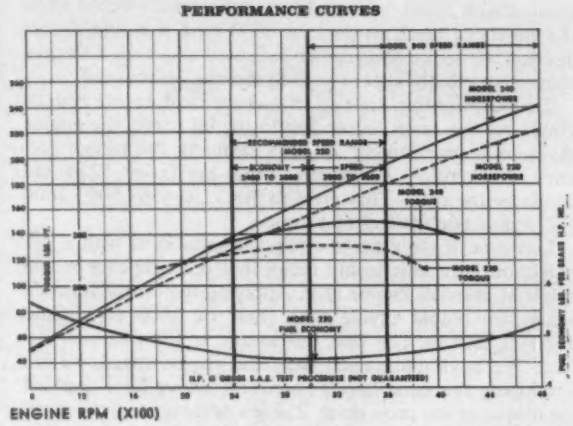

CHART NO. 2

The 14x11 wheel allowed the engine to wind up to 2700 rpm and an average speed of 25.63 mph. The 14x9 propeller allowed the engine to reach 3350 rpm, but showed an average speed of only 25.21 mph. The 13x10 wheel peaked at 3550 rpm and showed an average speed of 25.86 mph.

You'll note that the 13x10 wheel produced the greatest speed. However, at 2500 rpm, speed was only 17.96 mph. At 2500 rpm with the 14x9 wheel, the clocking was 17.72 mph; at the same 2500 rpm, the 14x11 propeller produced a speed of 24.59 mph. My choice would be the 14x11 wheel.

Note too the third curve on the graph that represents specific fuel rate. This is the number of pounds of fuel consumed per brake horsepower hour. At 2500 rpm, all three propellers would offer the same fuel consumption, but the 14x11 wheel would cover approximately five miles more per hour, and thus prove the most economical propeller by far. And the negligible difference in top speed between the 14x11 wheel at 2700 rpm and the 13x10 wheel at 3550 rpm certainly wouldn't warrant the additional wear and tear on the motor of the higher rpm—and the added fuel expenditure. Only in racing would a gain of a quarter of a mile per hour for 850 added rpm seem warranted.

Our second performance chart shows curves of two engines, both of approximately 280 cu. in. displacement. One is rated at 220 hp; the other, with a higher compression ratio, is rated at 240 hp. Both develop full horsepower at 4800 rpm. Maximum torque of the 220 hp engine is approximately 275 pounds-feet at 3200 rpm; maximum torque of the 240 hp model is about 325 pounds-feet at 3400 rpm. Horsepower at peak torque readings is approximately 165 and 185 hp respectively.

You will notice that maximum fuel economy occurs at about the same rpm range as maximum torque. This is significant for the owner whose interest is to operate his boat at the fastest economical rpm range. By use of a performance chart such as this, you could expect to achieve this highest economical speed if you were to fit your boat with a wheel that offers the highest degree of efficiency at about 3200 rpm in the case of the 220 hp engine, and 3400 rpm in the case of the 240 hp engine.

However, as you will see later in our full discussion of propeller selection, the most efficient propeller will not always be the fastest propeller.

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One interesting thing that is revealed in performance curves shown in the second chart is that greatest fuel economy is not necessarily encountered at the lowest rpm, as might be expected. So merely backing-off on the throttle may not give you more miles over the water per gallon of gasoline consumed. If we were to add one more performance curve to this chart, that of boat speed, this would be even more apparent. However, such a curve cannot be added except for one specific boat and propeller installation. This, too, will be apparent in our later discussion of propellers.

Looking again at these two charts, it is evident that there is one maximum rpm speed at which the greatest torque will be developed. While there is no doubt that each of the engine performance curves illustrated demonstrates an increase in horsepower in the rpm range above the point that maximum torque is reached, a boat should be fitted with a propeller that is best suited to the torque rpm range. This is better than needlessly winding the engine to higher rpm and burning more fuel—but getting less pounds-feet of work at the propulsion generating point of the outfit.

Ultimately, of course, to get maximum speed from an inboard engine you must take full advantage of the maximum horsepower that it can develop. We have pointed out, however, two factors that affect the inboard engine that should be given careful consideration by the owner who is interested in gaining speed, but does not want to risk the longevity of his power plant. Consult a performance curve. It will indicate that point in your engine's rpm range where you should be most concerned with gaining maximum speed.

Additional factors that affect speed of inboard powered boats will be covered next month. — ⚓

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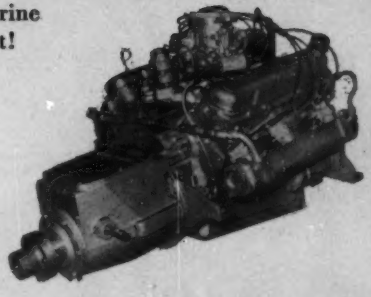

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P-1

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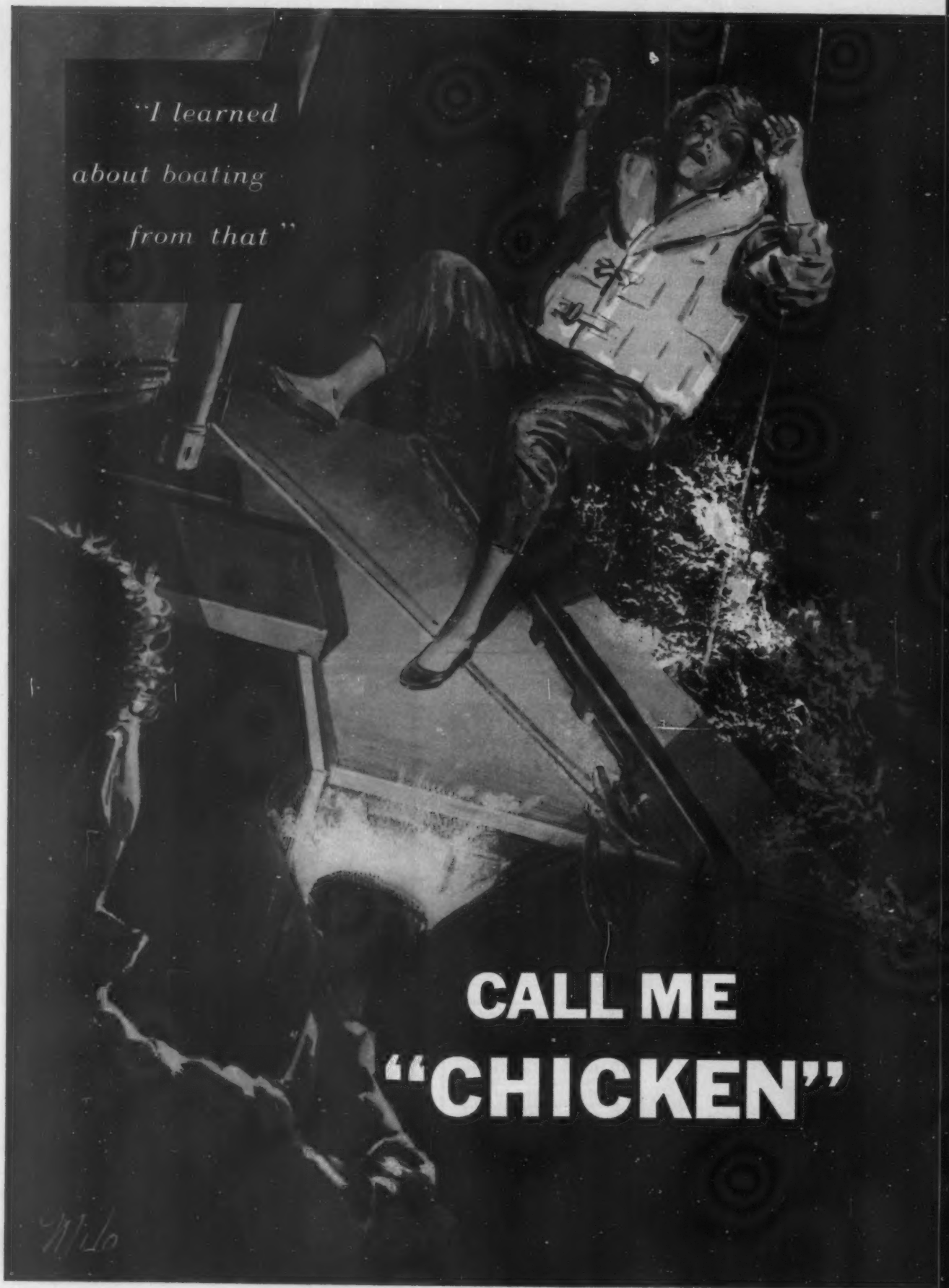
● Ample beam for safety. Plenty of sail for speed. Here's a lapstrake boat that really puts the wind to work. Ideal for youngsters who are getting their first taste of navigating. A thrill for seasoned hands. 90 feet of sail. Solid deck. Full-length decking. It's the BIGGEST little boat that ever faced a breeze! Write for details.

FREE CATALOG. Get the facts on the lapstrake sailboat. Also canoes, lapstrakes, dinghies and skiffs. Address: Old Town Canoe Company, 697 Middle St., Old Town, Maine.

"Old Town Boats"


"I learned
about boating
from that"
CALL ME
"CHICKEN"

By Bernard Christenson

ON A SUNNY AFTERNOON in July, 1949, we had sailed our 24-foot light displacement sloop *Siesta* from Grand Haven, Michigan to Muskegon, a distance of 12 miles. We stayed at the Muskegon Yacht Club, which we used as base of operations for what we hoped would be a pleasant week-end of sailing. *Siesta* was our first cruising sailboat, and our weekly jaunts were a family affair, with my wife and two daughters doing a yeoman job of crewing.

Snugly moored in a slip at the Club we spent a pleasant night, but arose to a gray Sunday morning with overcast skies and a promise of bad weather. Shortly before noon the ominous skies kept their promise, and the lake was whipped by 20 to 30 knot winds. To attempt to sail back to Grand Haven seemed nothing short of foolhardy, so we arranged for transportation by car to Grand Haven where we picked up our own car and drove to our home in Grand Rapids.

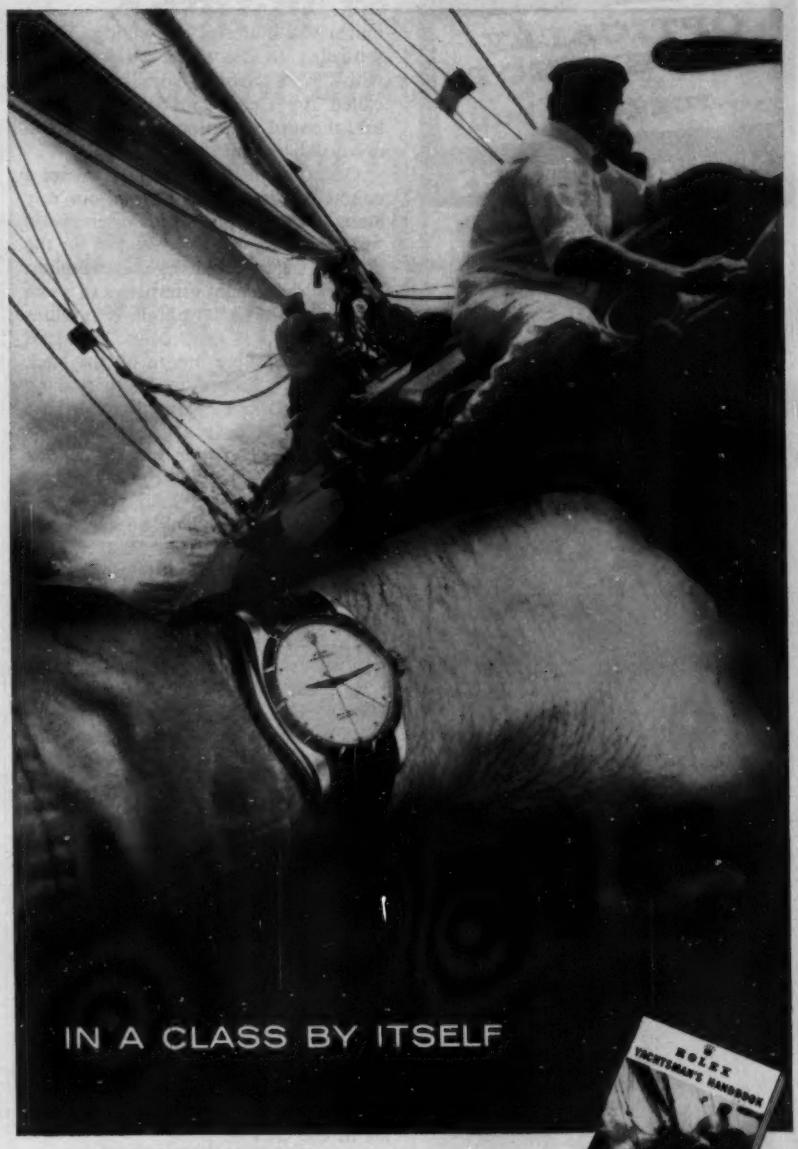
Monday afternoon I called the Weather Bureau from my office. Their report was doubtful, but it seemed worth a try, so we drove the 40 miles back to the Club that evening only to find that the weather had gone sour again. The waves were coming over the north pier. Chagrined, we returned home.

Tuesday night was a repeat performance, except that this time I "spliced the mainbrace" with a few Manhattans while I explained to the bartender and two or three veteran sailors how wise it was for me to "stay put," and in general giving them the full benefit of my two short years of Lake Michigan sailing.

Wednesday night we decided to have another go at it. We called two of our very close friends, Jack and Vivian Scudder, and asked them if they would care to go along. They would. Jack and Vivian had done a considerable amount of sailing with us in day sailers plus several jaunts in the *Siesta*. As we left Grand Rapids I noticed that the same weather pattern seemed to remain.

We arrived at the Muskegon Yacht Club about seven-thirty. The posted weather bulletin predicted squalls for the late evening. The heavy overcast hurried the cloak of darkness around us as we readied the boat for her 12 mile trip. Once ready, we drove to the beach for a look at Lake Michigan. The Lake was mirror smooth, dark and foreboding. Virginia (wife & 1st

(*continued on next page*)



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The fun of racing, boating and other aquatic activities often lies in the *timing*... accurate timing is acknowledged, best kept by Rolex Chronometers (officially certified for accuracy by a Swiss Government Testing Station). Hermetically, permanently sealed against the elements the Rolex Oyster (waterproof)* case protects the extremely accurate Perpetual (self-winding) movement. Handsome, functional styling sets the pace...in a race...or any place. See the ladies line, too...at the finest jeweler you know.

*When case, crown and crystal are intact.

This popular booklet featuring helpful interesting details on signal flags... timing techniques and Coast Guard weather information, is available free at your local jeweler or just send 10¢ in coin to: The American Rolex Watch Corp., 580 Fifth Avenue, New York 36, N. Y.

Seen here, the Rolex Zephyr Oyster Perpetual — the 25 jewel waterproof,* self-winding wrist chronometer. In stainless steel with 14 kt. gold diamond-cut bezel, $190, F.T.I. In 14 kt. gold case, $350 F.T.I. For awards and prizes, Rolex is the world's first choice.

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OPTICALLY PERFECT
....ruggedly built
SWIFT imported **BINOCULARS**

Swift quality ensures maximum brilliance and durability *plus* the convenience of removable eyecups (for those who wear glasses) and the beauty of brilliantly faceted diamond-turned eyepieces . . . all at surprisingly low prices. Optical formula is engraved on object ring.

Removable Eyecups

Engraved Optical Formula

7X, 35 NEPTUNE MK 11 Extreme lightness and brilliance make the Neptune ideal for general purpose use. Also available: 6X, 30; 7X, 35; 7X, 50; 8X, 30; 8X, 40; 8.5X, 44 standard, wide angle and ultra-wide angle binoculars in this monobloc design.

7X, 50 NIGHTHAWK Big, rugged, outperforms most Naval night glasses. Other German pattern Swift binoculars: 6X, 30; 7X, 35; 8X, 30; 10X, 50.

15X, 60 TYROL Super-powerful. Enables you to read boat names, recognize people etc. at "impossible" ranges from ashore.

WRITE FOR informative folder which also shows Swift astronomical scopes. Swift imported microscopes are widely used in school, hospital and industrial laboratories.

Binoculars Imported by Swift

SWIFT

Dept 59-P
SWIFT & ANDERSON, INC., Boston 25, Mass.

I LEARNED continued

mate) was doubtful but willing. Upon returning to the Club we were met with "Well, y'gonna go this time?" I called the Coast Guard Station and told them of my intentions; gave them my numbers and destination.

Once out in the Big Lake, we set a course due south and blurped our way along in smooth unruffled waters. Soon we were completely enveloped in the darkest night I can ever remember. The red range light astern was of some little comfort. After about 45 minutes of running in a dead calm, I noticed a soft but chilling breeze on the back of my neck. Since we were making about 5 mph in the same direction, the breeze had to have a greater velocity than our boat. Just in case "this was it," I gave Jack the tiller and Vivian a flashlight which she held while Virginia and I tied a double reef in our mainsail and ran up our jib. The halyards were barely made fast when the boat seemed to leap forward before a whistling northwest breeze. I was glad to have the wind well on my starboard quarter as it lessened our chances of an accidental jibe. As an added precaution we kept the outboard running, although it created more drag than push.

Had it been daytime, it would have been a thrilling sail, but this was like trying to find your way around in a coal bin at midnight. The wind had now risen until it fairly screeched through our rigging, and in less than 20 minutes the waves had built up to such proportions that we were lifted stern-high, and carried for hundreds of feet as if by a giant hand. Our boat was of the straight sheer type, with less freeboard aft than was healthy under such conditions. At the seas got steeper, the danger of getting pooped increased, especially since we were all aft in the cockpit.

I knew the time had come to shift our "live ballast" so that the boat would trim better. Since I needed Jack in the cockpit with me it was up to the girls. I told them to go below and forward, but they wouldn't have any part of it. They gave me two very good reasons; first, we were in the area where the commercial fishermen set their nets and they could use the spot to watch for them. Secondly; our cabin had a claustrophobic 3½ ft. headroom, which made it about as miserable a place to be as could be found on any boat. Virginia and Vivian had long since donned their life jackets and I sent them forward, via the handrail route, where they could hang on to the mast from its forward side.

Virginia went first. About three feet from the mast she was thrown upward with such force, that her grip on the handrail was broken. She was thrust against the starboard shrouds and only

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8.95
Juniors 7.95

- for non-slip safety
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White or Navy
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At Shoe, Sports, Marine, Dept. Stores. Write for dealer name, style folder

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For something new and personal in **STAINLESS STEEL** you should install this cast identification plate on the dash of your boat. Letters stand out in **BOLD RELIEF** in brilliantly **POLISHED** stainless on a richly contrasting background. Maximum of 14 letters on each of the first two lines. Standard design (as shown) $9.95 postpaid. Send your check or money order to **Dept. B,**

SIGNICAST CORPORATION
2629 S. Greeley St., Milw. 7, Wisc.
Prices on modifications of standard design on request

our generous light bracket, securely bolted to the stays, saved her from going overboard. The fear that gripped me at that moment can only be appreciated by someone who has had a similar experience. Finally, Vivian made it safely and the two gals took their positions with a firm grip on the mast.

The inky blackness of the night, the huge waves that I couldn't see and the near tragic incident had all but unhinged me when Jack asked, "Do you think we'll make it?" to which I replied we would. I was going to make darn sure we would. I decided to run the boat up on the beach. We were probably ½ to ¾ of a mile off shore as I eased the mainsheet and started a diagonal course for shore. I recalled then the many times I had read of what to do in a case like this. A seasoned sailor would head out to sea and "ride 'er out." At the moment, however, my main concern was for the safety of my wife and friends, and I would be a liar if I didn't include myself. I was ready and willing to join the ranks of any respectable group of "chickens" that would have me.

We were closing on the shore fast and we could hear the roar of the surf pounding on the sand beach. *Siesta* drew only 3 feet, and I was sure that we could walk or stumble our way to safety. Fortunately, we were still in deep enough water when I realized two very important things which in our excitement had escaped me. First, we were within sight of our home port and the harbor lights of Grand Haven beckoned us to our mooring. Second, we had not as yet taken any serious amount of water aboard and the boat, although taking an awful pasting, was standing up to the test. The outboard was dead and I was unaware of when it had quit. I decided to round up and take the wind abeam for the harbor entrance, less than a mile away. Right on top of a big one, I shoved the tiller down hard, and the boat came to starboard, shoving her port deck and cabin side hard into the back side of the wave. As we made progress to clear the North pier, the wind began to fade to a mere 15 or 20 mph, and it began to rain. Once we were lined up with the channel, we made a fast jibe over to the port tack and gratefully slid into sheltered waters.

Although this happened ten years ago, the lessons I learned are indelibly stamped on my mind. When all hell breaks loose it's easy to make a serious error, or several. I learned, too, that a good skipper must be able to make a decision and then carry it out even though scared stiff. Lastly, it is better to develop a profound respect for water and weather than to worry about being classified with the you-know-what members of the poultry family.

—⚓—

Another leading boat builder selects Curtiss-Wright

WHEELSMAN* *Power Control Steering*

Photo at Cypress Gardens

WHEELSMAN ADVANTAGES:

- **Provides Full-Time Control**
- **Eliminates "Kick-back" from Motor Torque**
- **Ideal for Trollers and Water Skiers**
- **Easier, Surer Boat Handling**
- **Costs far less than complex electric or hydraulic power systems...**

only $43.75 plus installation

Here are just a few of the reasons why so many leading boat builders are choosing the economy, safety and precision of the Curtiss-Wright Wheelsman for installation in their new models. Wheelsman controls the steering power of your engine—ends "kick-back" and the need for complicated electrical, hydraulic or push-pull power systems. With the Wheelsman, even women and children can handle today's high-powered outboards with complete ease and safety. No sideway from ski-tow, wind, wave or current can throw the boat off course. Yet a touch of the wheel changes the course in either direction—*without effort*!

Specify the Wheelsman for your own boat, or install it yourself... See your dealer today or write for full details.

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Marquette Division, Curtiss-Wright Corporation • Cleveland 10, Ohio

"Trailer Pulled 1100 Miles—Under water several times—Marine-Lube "A" good as new" *says Boatman R. K. Harris*

"In the past, I would have to take out the bearings, wash them and repack with grease . . . if I did not, rust would set up . . . since I've used Lubriplate Marine-Lube "A", I have pulled my boat 1100 miles and the wheels have been under water several times. I looked at the bearings today . . . they were in good shape . . . needed no grease at all!"

R. K. Harris

Thousands of trailer owners have shared Mr. Harris' experience. Lubriplate Marine-Lube "A" is *made to go under water* . . . it won't wash away . . . it's waterproof . . . Lubriplate works like a charm on winches, too . . . so be a carefree trailer boatman, use Lubriplate Marine-Lube "A". . . it takes care of all your marine lubrication problems.

Try it . . . in the bright red and white can at your marine, hardware or sporting goods dealer. Get Lubriplate underwater gear lubricants and 2-C Outboard Motor Oil, too! . . . all outstanding, time-tested products!

OUTBOARD OWNERS
Marine-Lube "A" on your steering post bearings . . . keeps your steering smooth, easy and safe.

LUBRIPLATE DIVISION
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Fire Extinguishers For Boats

As a result of mounting numbers of accidents from using toxic type fire extinguishers, the U. S. Coast Guard has withdrawn approval of "toxic vaporizing liquid type fire extinguishers, such as those containing carbon tetrachloride or chlorobromomethane."

The effective date of the new regulation was January 1, 1959, and since then only foam, or carbon dioxide, or dry chemical extinguishers of appropriate size and number, depending on the type and size of boat, have been acceptable as approved equipment.

Carbon dioxide (CO_2) is well suited for this galley fire. It dissipates and leaves no mess to be cleaned up.

These "toxic vaporizing liquid type fire extinguishers," however, manufactured prior to the new regulation, and in service and good condition, may be used until Jan. 1, 1962.

Coast Guard minimum fire extinguisher requirements for Class A motorboats under 16 feet in length, and Class 1 motorboats between 16 and 26 feet long are one B-I hand portable units which contain at least 1¼ gallons of foam, or 4 pounds of carbon dioxide, or 2 pounds of dry chemical. The only exception to this rule is that "outboard motorboats less than 26 feet in length, of open construction, not carrying passengers for hire, are not required to carry fire extinguishers." The Coast Guard interprets the term "not of open construction" to describe a boat which has a cabin or any other enclosed space such as a bow locker.

Class 2 motorboats measuring between 26 and 40 feet in length must carry two B-I hand portable fire extinguishers, described above, or the

FLO-VUE

The only electronically controlled warning light operated by actual contact with water only.

Can be installed on any inboard or outboard water-cooled engine.

Pat. Pend.

Red Light Flashes On instantly if steam forms due to stopped water outlets; Or insufficient **Water Flow** due to damaged water pump, or obstructed water inlets; warning operator before any damage occurs to the engine.

Easy to install.

Complete instructions

Write Direct	List $21.95	*Dealers Inquiry*

Midwest Marine Mfg. Co.
7805 Lake Drive
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ORLANDO CLIPPER

WINS AGAIN!

IN THE RECENT GRUELING 300 MILE SANFORD TO JACKSONVILLE AND RETURN MARATHON THERE WERE 3 ORLANDO CLIPPERS ENTERED BY INDIVIDUAL OWNERS. ALL HAVE HAD APPROXIMATELY 4 YEARS HARD USAGE. THEY FINISHED 1st IN THE 45 HP CLASS AND 1st AND 2nd IN THE 40 HP CLASS.

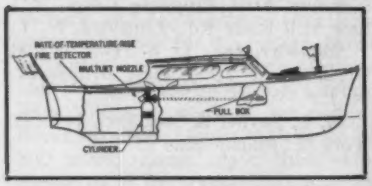
ORLANDO CLIPPER BOATS ARE DESIGNED FOR A LIFE TIME OF MINIMUN MAINTENANCE HIGH PERFORMING SERVICE. WHY DON'T YOU INVESTIGATE ORLANDO CLIPPER AND RUN WITH THE CROWD.

Write for free literature

ORLANDO BOAT CO.

507 ELWELL ST. · ORLANDO, FLA.

This handy, lightweight dry chemical extinguisher is properly mounted in an accessible place, ready for use anywhere in the boat, fore and aft.



Fixed extinguishing system in engine space has manual and automatic trigger, smothers fire by reducing oxygen in compartment.

one B-II extinguisher containing at least 2½ gallons of foam, or 15 pounds of carbon dioxide, or 10 pounds of dry chemical, unless a fixed fire extinguishing system is installed in the machinery space, in which case one additional B-I hand portable unit is acceptable.

Class 3 motorboats between 40 and 65 feet in length are required to carry three B-I extinguishers, or two B-I hand portable units if the machinery space is fitted with a fixed extinguishing system, except that one B-II unit may be substituted for two B-I units, as in the case of Class 2 boats.

Further information on the subject is published in "Pleasure Craft" CG-290, available free of charge from U.S. Coast Guard Headquarters, Washington 25, D. C., or any Coast Guard station.

Both carbon dioxide and dry chemical extinguishers are effective against Class B fires (oil, gasoline, grease, paint etc.) and Class C fires (electrical equipment). Both will control **small** Class A fires (wood, cloth, paper, etc.) but foam is better suited for this use. Disadvantages of foam are that it is un-

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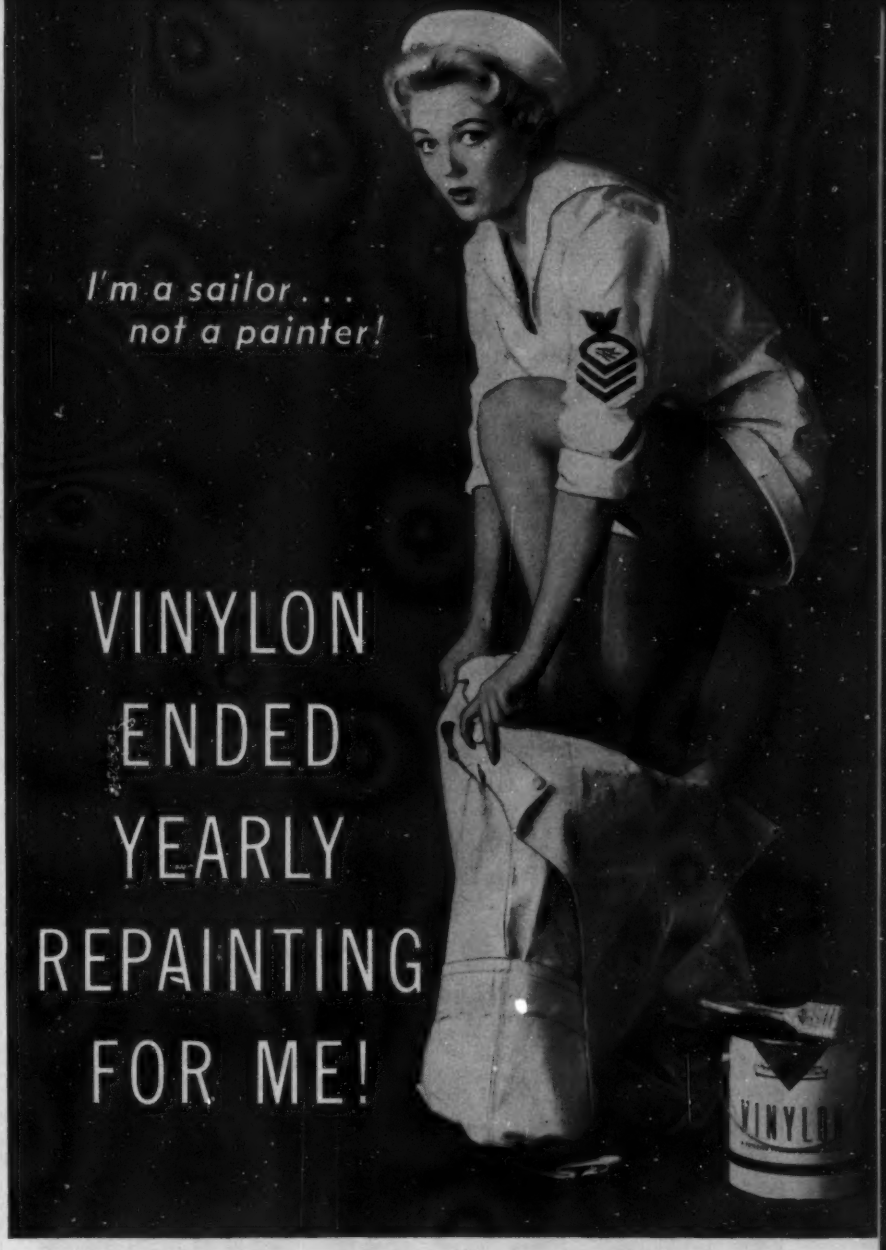

That's right! VINYLON Liquid Plastic gives you more time to enjoy your boat . . . reduces maintenance up to 80%.

And it's so easy to use. You put it on like paint and it forms a tough, elastic skin that actually stretches 100%. It won't crack, chip, peel or break at the seams . . . and its color is bright as new the second season.

You use three coats the first season . . . none the next. Then only one coat every two years maintains the beautiful finish and watertight resilience!

More work saved: VINYLON goes on over any well-bonded paint. No scraping, sanding, burning off old paint. The thicker VINYLON gets, the better. So you never face the task of "wooding down".

VINYLON is recommended for wood, metal, fiberglass, is especially good on canvas and for skid-resistant decks. VINYLON is at your dealer's now.

If your dealer can't supply you write for free literature, color card, actual sample strip and dealer list.

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ORIGINAL LIQUID PLASTIC MARINE FINISH
SEVEN SUCCESSFUL YEARS IN WORLD-WIDE USE

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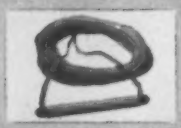
Vinylon colors & clear $5.95 per qt.
Vinylon Anti-fouling $7.00 per qt.

It's more like *Flying* than ever . . .

If you're the kind who likes the rush of water around your feet and the buoyant excitement of riding the boards behind a fast boat, then this Ski Tow Rope is for you. It's made of lighter, stronger, polyethylene . . . makes skiing feel more like flying than ever. Columbian Ski Tow Rope floats and is easy to spot in the water because of its bright yellow color. See your Marine Supplies Dealer and pick up a better tow.



COLUMBIAN POLYETHYLENE WATER SKI ROPE, 75 ft. long with pebble surfaced plastic covered handle. In transparent, re-usable plastic bag. Available with double handles

COLUMBIAN MANILA WATER SKI ROPE, 75 ft. length with pebble surfaced plastic covered handle and large red and white float. In re-usable plastic bag. Available with double handles

"KNOW YOUR ROPES FOR BETTER SAILING" . . . this book with illustrated knots and splices comes in a waterproof plastic envelope, ideal for keeping boat registration. The book **plus** floating bobber chain to keep keys out of Davy Jones Locker is yours for only 50 cents in coin.

ROPE COLUMBIAN TWINES

COLUMBIAN Rope Company
Auburn, "The Cordage City," New York

FIRE EXTINGUISHERS

(*continued from page* 127)

suited for use against electrical fires, is subject to freezing, and should be discharged and replaced annually.

Manufacturers of approved fire extinguisher equipment include the companies listed below. Detailed information on their products may be obtained by writing direct to them, or contacting their dealers in your area.

American LaFrance Div., Sterling Precision Corp., Elmira, N. Y.

Ansul Chemical Co., 1 Stanton St., Marinette, Wis.

Fyr-Fyter Company, 221 Crane St., Dayton, Ohio; also **Pyrene C-O-Two Div.,** Fyr-Fyter Co., P. O. Box 750, Newark 1, N. J.

General Fire Extinguishing Corp., 8740 Washington Blvd., Culver City, Calif.

Interstate Precision Products Corp., 522 E. Vermont Ave., Anaheim, Calif.

Walter Kidde & Co., Inc., 431 Main St., Belleville 9, N. J.

Leeder Manufacturing Co., 133 Woodside Ave., Briarcliff Manor, N. Y.

Safety First Products Corp., 175 Saw Mill River Rd., Elmsford, N. Y.

Stop-Fire, Inc., U. S. Hwy. #1 at Black Horse Lane, New Brunswick, N. J.

M. L. Snyder & Son, Inc., 1819 E. York St., Philadelphia 25, Pa.

N.O.A. REDESIGNATES 3 DIVISIONS

THE National Outboard Association board of directors recently agreed to new name designations for the three divisions of racing: Professional, Semi-Professional, and Amateur. It was agreed that only the Professional Championships would be designated as World Championships. A distinguishing factor between Pro, Semi-Pro and Amateur events is that the latter two are restricted to American made motors.

World Championships for the Professional Division for 1959 will be held at Springfield, Ill., sponsored by the Midstates Outboard Racing Association. Races will take place on Lake Springfield on September 18, 19, 20, and 21.

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Foreign rates: Pan American Union countries, add .50 per year; all other foreign countries, add $1 per year. Mail to:

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SPEEDLINER for '59

BOATS • KITS • WATER SKIS

In PLYWOOD or FIBERGLASS Everything You've Wanted

Sports car performance . . . breath taking speed (Speedliner has won 52 racing championships in the last 9 years) . . . safe, rugged construction . . . beautiful design and interiors . . . Speedliner's 32 Philippine mahogany plywood and fiberglass models for '59 have everything you've wanted. See them at your Speedliner dealer soon.

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Please send me complete information on
☐ Speedliner Boats & Kits ☐ Skis & Ski Kits
☐ Protected Dealerships ☐ Racing Models
NAME _____
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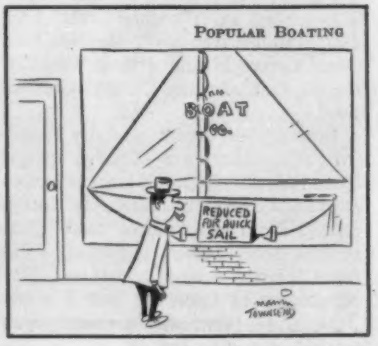

MOVIE DEPICTS LIFE OF JOHN PAUL JONES

JOHN PAUL JONES, a movie based on the life of America's first naval hero, is scheduled for release this summer by Warner Bros. Starring Robert Stack, the movie was filmed in England, France and Spain.

Full-scale replicas of *Bonhomme Richard* and *HMS Serapis* were constructed in Italy for the picture, based on brigantines approximately 50 years old. They were sailed by Captain Alan Villiers from Ostia, the port of Rome, to Denia, Spain, a distance of 800 miles. These and a third ship, converted at Barcelona, were handled during the filming by Villiers, and by John Farrow, the movie's director.

—⚓—

SANDPIPER BUILDERS PATENT NOTICE

"WE ARE THE SOLE OWNERS of U. S. Patent Number 2675,-775 issued April 20, 1954 for 'Rudder Releasing Mechanism for Small Boats'.

"We are taking this means of giving publicity to the above fact and are asking the trade to cooperate in the protection of our patent relating to the above mechanism.

"This notice is made necessary by the articles on pages 53 and 54 in the June, 1959 issue of POPULAR BOATING describing the 'Sandpiper' sailboat. It is the opinion of our legal counsel that the sale, use or manufacture of the rudder release mechanism shown in the above mentioned article (even for one's own use) would constitute an infringement of our patent rights."

Waterbury, Conn.
ALCORT, INC.

For purchase information for Alcort cast-bronze flip-up rudder mount and other spars and fittings, write to: Parts Department, Alcort, Inc., Box 1345, Waterbury, Conn.

Young in heart, but wise in ways of the sea. They know a boat must be completely safe. Even the tools aboard won't rust, ever. More than just "rust-resistant," they are made of completely **non-corrosive** beryllium copper. And this good-looking, modern alloy means tools are non-magnetic, so instrument readings are never upset. Another plus for safety: spark threat is eliminated. *They cost a little more . . . but look at the extra value you get.*

Safety Tool Div., THE BERYLLIUM CORP., P. O. Box 1462, Reading, Pa.
Please send me free copy of your new brochure.
Include name of my nearest distributor.

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MR. DEALER: A few choice franchises are available. Check here ☐ for more information.

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BOAT CLUB BEACONS

SAFE BOATING AWARDS TO GO TO YOUNG SKIPPERS

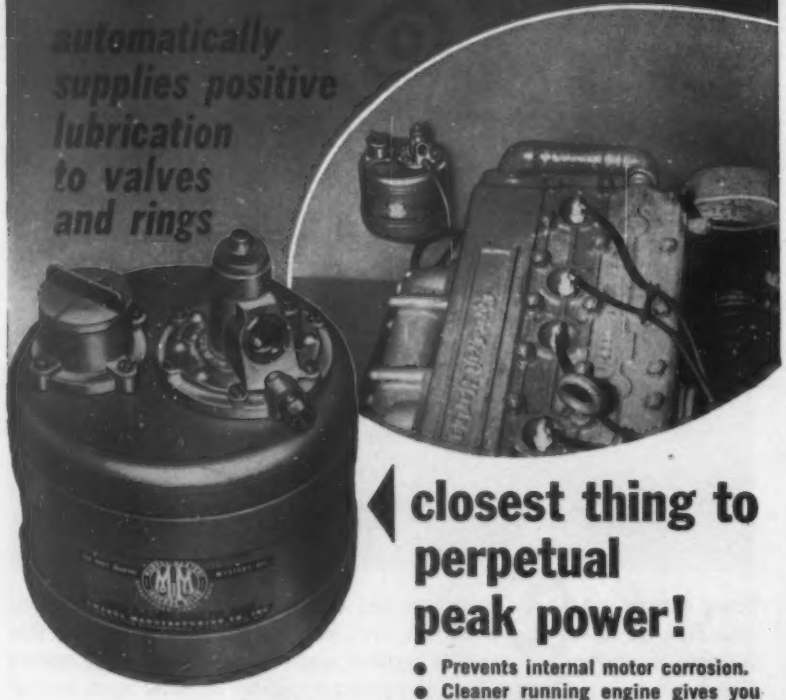
A SERIES OF PRIZES for safe boat handling are to be awarded boys and girls under 18 years of age by the Dale Yacht Basin, Bay Head, N. J., it was recently reported. The awards, beginning this summer, are to be permanently established and contested for annually.

All boys and girls under the age limit of 18 are eligible, and there will be no restriction on the kind of boat they may be operating at the time they are observed and cited by the jury of selection. The jury's recommendations will be based on one or several of the following: "unusual courtesy, skill, thoughtfulness, regard for the comfort and safety of others, knowledge of the law, consciousness of good practice on the water, awareness of the limitations of their own craft or exceptional knowledge of the traditions of the sea and the responsibility of a skipper."

Coast Guard Auxiliary Members, New Jersey Harbor Masters and club representatives will submit candidates for the prizes at the end of each of 5 two-week periods which begin on Monday, June 15. A panel of judges drawn from boating organizations, clubs, and community officials in the Barnegat Bay and Manasquan River area will award prizes every two weeks.

MARVEL®
INVERSE OILER

automatically supplies positive lubrication to valves and rings



closest thing to perpetual peak power!

- Prevents internal motor corrosion.
- Cleaner running engine gives you longer spark plug life.
- Reduces internal frictions assuring smoother running engine at all times.
- Keeps RPM needle steady.

A MARVEL INVERSE OILER quickly pays for itself in reduced maintenance costs alone!

Available in 2 and 4 quart capacities. Installation kits available for easy installation on any gasoline engine.

For use only with MARVEL MYSTERY OIL...the proven lubricant that keeps marine engines at peak efficiency, assuring lower fuel consumption.

MARVEL MARINE DIVISION
EMEROL MANUFACTURING CO., INC.
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MARINAS

NAEBM PUBLISHES MARINA MANUAL

BOAT HANDLING EQUIPMENT in the Modern Marina, by Andrew R. Mack, Rear Admiral U.S.N. (ret.), consultant, and Frederick R. Harris, Inc., Consulting Engineers, has been published by the National Association of Engine and Boat Manufacturers. The manual is the sixth in a series on marina operation.

BAHAMA SKIN DIVING

STANIEL CAY YACHT CLUB, in the Bahama Exumas south of Nassau, has been announced as a new skin diving area. Visiting yachtsmen report it to be a region virtually unexplored by divers and offering a wide variety of submarine life. Inquiries may be addressed to Walter Schubert, Staniel Cay Yacht Club, Staniel Cay, Bahamas.

APBA OFFICER HONORED FOR INT'L ACTIVITIES

FOR OUTSTANDING SERVICE in the promotion of international boating activities, Vivyan Hall, of Miami, Fla., chairman of the International Affairs Committee of the American Power Boat Association, was recently awarded the Union of International Motorboating's medal of honor for 1958. The 34-nation world motor boat racing supervisory group headquartered at Ghent, Belgium, said that Hall was instrumental in effecting U.I.M. approval and adoption of the U. S. predicted log cruiser competition program developed by APBA under William Edgar John, Rye, N. Y., cruiser vice president and POPULAR BOATING's Boatman of the Month, May, 1958.

Floridian Hall also initiated the

NATIONAL ONE DESIGN IN FIBERGLASS & KITS

THE NATIONAL One Design Class sloop is now available in a fiberglass model from Toledo, Ohio, boat builder, Ray Green. According to Arch K. Meserole, of Lancaster, Pa., the new fiberglass hulls are to be equipped with aluminum masts.

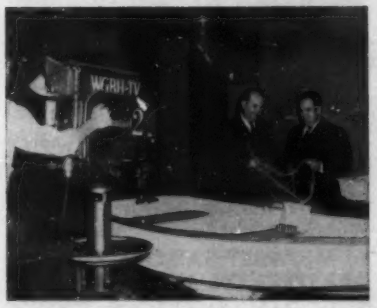
For do-it-yourself skippers, there are also frame kits for home construction available from the Secretary Treasurer of the Class, Peter A. Geis, Severna Park, Md. Kits can be had for both the conventional planked boat and a plywood constructed National for the lightest and easiest to build boat, Mr. Meserole reports.

movement for the U.I.M.-sponsored world championship regatta for inboard and outboard classes to be held in Italy, in 1960.

C. G. AUXILIARISTS SET SAFE BOATING WEEK EXAMPLE

THOUSANDS OF COAST GUARD Auxiliarists in 560 Flotillas all over the country are going all out to promote National Safe Boating Week, June 27-July 5. In addition to posters, streamers, television films and radio announcements encouraging the boating public to exercise caution and common sense afloat, special emphasis is being placed on C.G. Auxiliary Courtesy Examinations of boats and enrollment of individual boatmen in free boat handling courses.

In the Boston, Mass. area, boatmen have the opportunity of studying basic seamanship with the help of television.



"Boatmanship" via TV is taught in the Boston area by S. A. Lesser, right, and D. McFarlane of C. G. Aux.

Sheppherd A. Lesser, Training Officer, Milton Flotilla 500, reports that he feels he can reach a much larger number of people over WGBH-TV, Channel 2, than by any other means, since many could not show up in person for classes.

An estimated 15,000 are learning the "do's" and "don'ts" of boating over television and certificates will be awarded to those viewers who pass the final examination to be given at various designated locations.

A ratio of "boating experts" to "landlubbers" was one of the items of information evolving from a quiz conducted by C.G. Auxiliarists at boat shows in the San Francisco area. District Commodore Jerry Ryan reported that 4 out of 5 boat show visitors were "landlubbers". Few scored 80 per cent or better, which classed them as "skippers" or "mates". Commodore Ryan also noted that most persons taking the quiz signified that they were boat owners. Applicants for the C.G. Auxiliary boat course were signed up.

Elsewhere in the country thousands of other pleasure boatmen are also taking the Auxiliary's public instruction courses, and during National Safe Boating Week there will be special boat

(*continued on next page*)

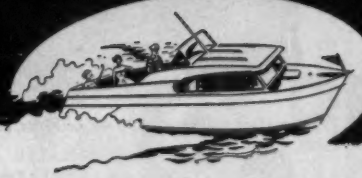
MODEL DF-2

new TRANSISTOR RADIO

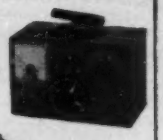
direction finder kit

only $69.95

HEATHKIT

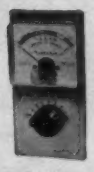


OTHER HEATHKIT "DO-IT-YOURSELF" MARINE KITS . . .

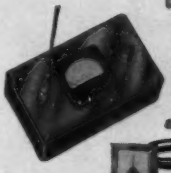


Model DF-1 Radio Direction Finder Kit $54.95

Model MC-1 Marine Converter & Battery Charger Kit $39.95



Model CI-1 Battery Charge Indicator Kit $16.95



Model PM-1 RF Power Meter Kit $14.95

Model RI-1 Rudder Position Indicator Kit $14.95

Model FD-1 (6 & 12V) Fuel Vapor Detector Kit $35.95

- *doubles as a portable radio*
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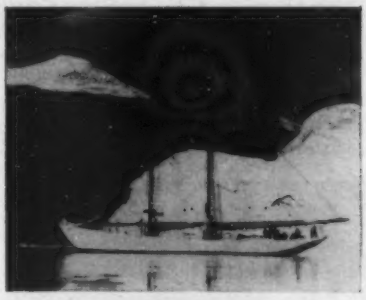
BEACONS

(*continued from page* 131)

handling courses as well as a stepped up program of free courtesy motorboat examinations, according to Bliss Woodward, National Vice Commodore and Chairman of the Coordinating Committee for Safe Boating Week.

Clubs, other organizations and individual boatmen can help make this year's observance the safest yet, and add their effort to improving the conditions of boating, by contacting the U.S. Coast Guard Auxiliary headquarters closest to them.



Famed as an Arctic explorer under command of Admiral MacMillan, the Bowdoin is scheduled to arrive June 27 at Mystic Seaport Museum, Conn.

MIDWEST SAILORS NOTE EASTERNERS' INDIFFERENCE

THE PAN AMERICAN GAMES will be at Chicago this year, and Dragons, Stars, Lightnings, Flying Dutchmen, Snipes, Finn Monotypes and 5.5 Metres will compete for top honors. But the Midwest Collegiate Sailing Association has gone on record as resenting the usual lack of interest on the part of Easterners in sailing in Midwestern waters.

It has been the understanding, in the Midwest Collegiate S.A., that if a sailing group is unable to accept an invitation to compete, it should at least have the "sportsmanlike courtesy" to officially decline. According to Mr. Ron E. Marshall, the Midwest travels to the Atlantic Coast approximately six to nine times every year to race Easterners, whereas Eastern collegiate sailors only show up about once a year in the Midwest.

C-D AUTHORITY COMMISSIONS NEW BOAT

A TREND toward using much smaller craft in marine patrol, safety and rescue operations, may soon develop if a current experiment by New Jersey Burlington County Civil Defense Authority proves successful.

After initial studies on how to cope with the increase in boating activity in both inland and coastal waters, E. Budd Marter, III, coordinator of civilian defense and police activities, joined forces with Allan D. Macfarlan, manager of Green Island Marina,

Silverton, Toms River, N. J., to develop a boat more rugged and versatile, yet less expensive, than those in current use. Mr. Marter sought a piece of equipment, geared for year-round operation, that could withstand ice, rocks, sandbars and other hazards. At the same time it had to be fast, seaworthy and capable of handling heavy loads.

The boat selected had to provide space for two first-aid litters, wide enough room for a doctor or first-aid man to work either by day or night. In addition, its basic equipment had to include a police radio, siren, flasher, searchlight and cockpit floodlight together with first-aid, life-saving, and fire fighting equipment.

The boat selected for testing purposes weighs slightly over 1,800 lbs., loaded and manned, and easily attains a speed of better than 25 mph with twin 35 HP outboard motors. Authorities in several counties and states are keeping a close watch on the experiment with the idea of possibly adopting it themselves.

NEW PACIFIC MARINA IN S. F. BAY AREA

A LONELY GRAVEYARD of sunken ships on the north shore of Alameda, on San Francisco Bay, has been converted to what will be one of California's largest recreational boating centers, according to Mr. Richard Carpenter, manager of the new "Pacific Marina."

Two dredges of the Pacific Bridge Company scooped mud and rotten hulls from the bottom of the Alameda Estuary to clear the water for an anticipated 500 boats to be accommodated in the new facility, and construction of shop, restaurant, motel, plus 14 acres of landscaped grounds and parking area, is planned.

The yacht harbor covers over nineteen acres of water which through the years has served as a final resting place for derelict vessels. None of the ships dredged up in the clearing operation has been identified, Mr. Carpenter said. One wooden ship apparently had sides more than three feet thick, and several recovered propellers and shafts were made of cast iron.

The Pacific Marina is located at the north end of Sherman St. in Alameda.

SIX-PIER BOSTON MARINA TO ACCOMMODATE 200 CRAFT

BOSTON'S NEW HARBOR MARINA, at the former Squantum Naval Air Base, is reported to have six piers with slip accommodations for 200 boats and a 50-foot launching ramp built to handle sea-planes.

Mooring rates are available on daily, weekly, monthly or seasonal basis, with costs for a 30-footer running about $172.50 for the May through October season, according to General Manager Alan Hill.

For small boat owners, a rate of $1.00 per day has been established for use of the launching ramp, and a seasonal fee of $60 for ramp and inside storage in the marina's 93,000 square foot storage hangar.

U. S. ARMY HOST TO 95 MILLION WATER SPORTSMEN

THE LAW OF THE LAND provides "that the waters of reservoir areas in the Civil Works program shall be open to public use generally, without charge, for boating, swimming, bathing, fishing and other recreation purposes and ready access to, and exit from, such water areas along the shores of such reservoir areas shall be maintained for general public use." (68 Stat. 1266), as reported by the U.S. Army Corps of Engineers, authority for the development and maintenance of such projects.

94,793,000 persons took advantage of this privilege last year and enjoyed over 3 million acres of public waters under control of the Army Engineers. The number represents a twenty-fold increase over that in 1946, according to an Army report.

The report, titled, "A Summary of Public Use and Project Data, Civil Works," has just been published and includes information on numbers of boat launching ramps and locations, picnic and camping grounds, availability of rental units, etc. Further information may be obtained by writing Hq., Dept. of the Army, Office of the Chief of Engineers, Washington 25, D. C.

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Complete package: **$259.50**

Includes unit, matched antenna, antenna mounts, microphone, and four crystals for operation at 2182 Kc and 2638 Kc.

Fill your need from this choice of Kaar radiotelephones:

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☐ TR 242A ☐ TR 219 ☐ TR 222A

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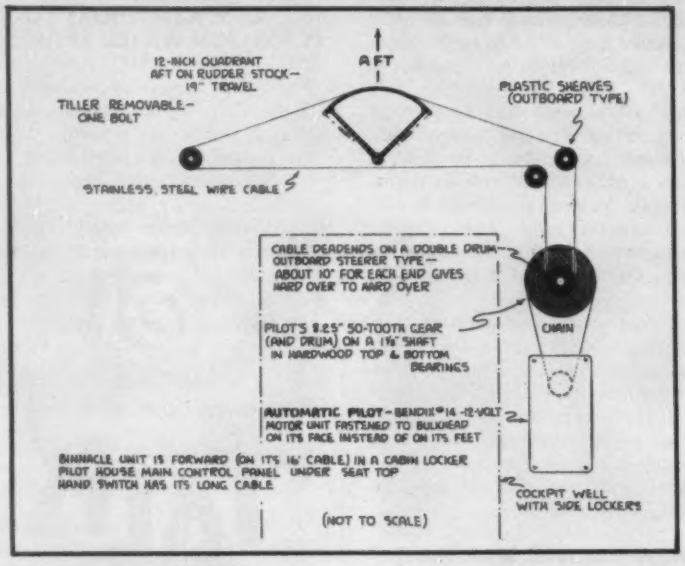
FITTING OUT with Jim Emmett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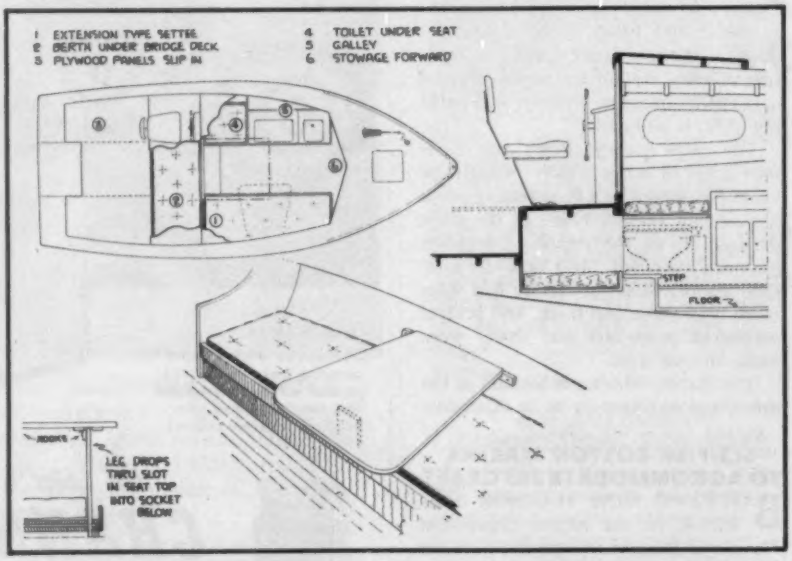
BINNACLE UNIT IS FORWARD (ON ITS 16' CABLE) IN A CABIN LOCKER
PILOT HOUSE MAIN CONTROL PANEL UNDER SEAT TOP
HAND SWITCH HAS ITS LONG CABLE
COCKPIT WELL WITH SIDE LOCKERS
(NOT TO SCALE)

ELECTRIC PILOTS FOR SAILBOATS

THIS WAY OF INSTALLING an automatic pilot was worked out by the Arnold C. Gay Yacht Yard (Annapolis, Md.) in conjunction with Sidney Griffin, well known there in the electronics field. It solves what has always been a problem—fitting such a unit in a sailboat with a tiller and with the rudder stock at the usual more or less acute angle. The boat is a 40-foot aluminum cutter, *Libra,* owned by George Bell of Washington, D. C.

Naturally, the conventional all-chain hookup as used on power boats won't work, if only because a quadrant, which had to be fitted aft on the



OUTBOARD CRUISER CABIN ARRANGEMENT

WHAT JACK CUMMINS of Buffalo really wrote in about was to describe the over-a-seat type of table used aboard his chunky 18-foot outboard cruiser. However, as his rough sketch showed the boat has a number of other equally interesting cabin or living features.

I like the general arrangement of the cabin, the settee one side, the working space the other. Notice the athwartships berth, which because of the boat's 7′ 6″ beam and rather high freeboard is entirely practicable. As Jack

stock. Stainless steel wire cables lead from this by means of plastic outboard boat-type steering sheaves to a double drum of the outboard steerer sort. These outboard parts are lightweight and the right size, as well as being plenty strong for the job. Naturally, the wire cable allows for the quadrant being off level.

The 1⅛-inch bronze shaft for drum and pilot's gear is held, top and bottom, by shop-made hardwood bearings, which, given a drop of oil occasionally, serve fine. As with any installation the ratios of the hookup had to be worked out right. Here only about 10 inches of cable each end on the drum suffice to give the quadrant and its rudder full travel from hard over to hard over.

The location selected for the pilot's motor unit—in a cockpit side locker—makes that part easily accessible. Also, the two smaller hatches either side aft facilitated the hookup. Notice that the unit isn't secured upright in the usual way. As is, it functions properly and is even better placed for any servicing. The binnacle unit or compass was purposely located in the cabin, in a locker there to be away from the magnetic attraction of the engine.

While these electronic or mechanical steering devices were no doubt designed primarily for power boats they're being found to be even more of a help aboard sailboats. Such use is even possibly easier on the unit since under sail at least it has less correcting of the course to do.

says, they can sack in their six-year-old son early and still use the cabin for lounging and get-togethers without disturbing him. The main settee itself pulls out a foot, giving a rather narrow but double berth. It still leaves a passageway for using the toilet or getting to the storage space forward. The table that Jack enthuses over is easy to set up or take down—you just undo the two hooks, lift the leaf out of its chocks and pull up the upright.

To my mind, the bridge deck, worked in to accommodate the cross bunk, improves the cockpit. For one thing, it gives a wide seat there. And with the removable helmsman's chair it makes for handy steering. Moreover, the pair of ½-inch plywood panels, for dropping in chocks to give a pair of cockpit berths for use with air mattresses, are short enough to be easily stowed.

As Jack explains, this boat started out as a kit, which he and the wife assembled. The cabin arrangement resulted from not only a close observance of such other small cruisers as they could see but studying layouts as shown in the design sections of the different magazines.

(*continued on next page*)

SPECIAL

INTRODUCTORY

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EMMETT continued

EXTRA LINE AIDS IN HANDLING ANCHOR

TOM GERMANN of Newfoundland, N. J. writes: "If you have a small boat with a foredeck and you move from spot to spot often, as when fishing, and have to take up the anchor each time, it becomes a problem to climb out to the bow, especially if your boat is equipped with a windshield. A simple solution is to tie a short (light) line to the anchor rode at a point about 5-6 feet from the bow and fasten the other end near you in the boat. When you want to weigh anchor, simply pull on the short line until you reach the anchor rode and then haul up the hook." Tom goes on to explain that of course enough slack should be left in the short line that it won't interfere with anchored boat.

This snatch line, or whatever you want to call it, can also be used to keep the boat steadier at its anchor. If because of the wind or current she's uneasy, yaws about to tack off first on one side and then the other, try leading the snatch line to an after cleat. Put just enough strain on it to have the bow fall off sufficient for the wind or current to catch it, causing the boat to ride slightly side-to and held steady there. You may have to make a few tries at getting the tension just right but this is an old trick of big-boat fishermen.

The rolling hitch is a good way of securing the light line to the heavier one since it won't slip under strain. Notice that it's merely a clove hitch but with an extra turn. That side, the one with the extra turn, should be towards the direction of the pull—the boat—for effective holding. Naturally, the extra line is hitched on at a point convenient to tie it, then enough rope is let out to have the knot the desired distance from the bow when it's made fast to the deck cleat. Or, if you anchor your outboard from a ring bolt in the stem, as indicated by the dotted line in the sketch, hitch on your snatch line before putting the last half-dozen feet of the rode over.

PLASTIC SHEETING PROTECTS AGAINST ICE

WILLIAM FAIRLIE, genial owner of Chesapeake Bay's Worton Creek Marina, one of the prize-winners in the current Inland Waterway Guide best-marina competition, passes along this one for the benefit of those who prefer to winter their boats in the water.

I don't have to go on to explain how "window-pane" or very thin ice carried by the wind or current can damage a boat's planking, for if you

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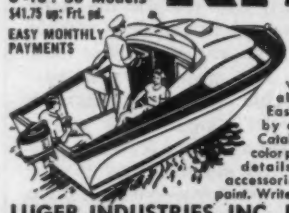

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store your boat under such conditions you'll realize the danger. Anyhow, Bill has used this plastic for three years now and with perfect satisfaction. One 46-footer, on which it has been used from the start, showed no signs of even the paint being removed.

Bill likes to haul boats left in his care for winterizing then relaunch them. Naturally, such protection can be best put on then. Incidentally, he charges only for labor and any materials. However, as he points out, the strips can be put on with the boat in the water, if you have to. This plastic is sold for home use, being listed under floor covering materials at around 24 cents per foot in a 30-inch width. It's corrugated and rather stiff but comes rolled and is easily cut in to strips 7½ or 8 inches wide. The strips should be fastened along the waterline, of course, to be half in, half out of the water. The top edge should be stapled or tacked securely, every few inches apart. The lower edge can then be tacked well enough to hold by doing the hammering under water, possibly with the boat heeled to help.

In spring the strips are ripped off and discarded, then the tiny tack holes are filled as a part of readying for painting. Personally, I'd use only non-rusting bronze staples or copper tacks. Then, if a point broke off in the wood, no harm would be done.

FENDER STICKS

WHEN PAINTING or working from a float by all means make yourself a pair of puddings or fender sticks. They serve a double purpose. Particularly if you're sanding or painting low down on the topsides they permit keeping the float enough away from the hull for handy working. Too, they're easy on the paint. You have only the two points of contact instead of the full length of the float's firehose or other edge fender. Moreover, it's a simple matter to tie or tack on clean coverings to avoid dirtying the sanded or cleaned surface.

In their simplest form these float fenders are merely a pair of sticks, each with its wad of cloth tacked or tied to the end, secured to the float to with lines made secure to hold it the desired distance away from the hull. However, if it's a float of your own rather than a rented or borrowed one, it's sensible to better the arrangement. Often a couple of thicknesses of 1-inch sponge rubber are tacked to the stick's end, then canvas stitched and tied in place. Instead of nailing the sticks to the float each can have its pair of permanently fastened metal or wood chocks. These should allow the sticks to slide in and out and include some way of locking them in place where wanted. Small wedges can be used or a series of holes can be bored in the sticks with pins used to drop through holes in the chocks. — ⚓

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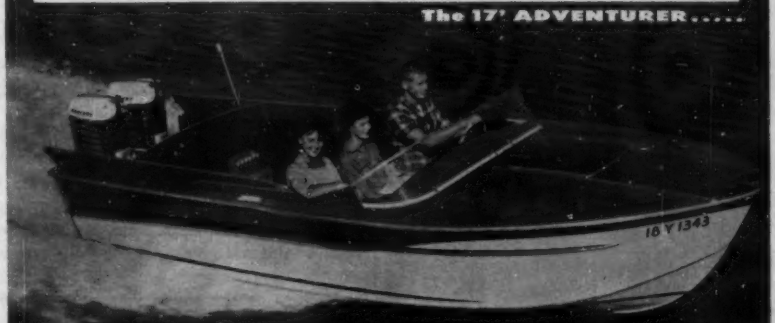

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SEAMANSHIP

PROTECT AGAINST CHAFING AND WEAR

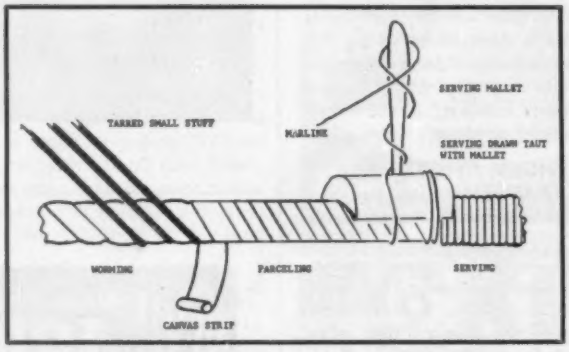
By Elbert Robberson

FRICTION holds much of a boat and its gear together. Nails fastening the planking resist falling out, or even forced withdrawal, by the friction of their sides against the material of the hole they occupy. The bolts in an engine resist coming unscrewed through the friction of the mating threads, and the head against the surface of the part being held. In a rope short, twisted fibers hold tightly to each other in yarns, the twisted yarns hug each other in strands, and when the strands are laid up they cling tightly, holding the entire build-up together—all through the grip of friction. Obviously, boating would be impossible without it.

However, friction in the wrong place, or any that is allowed to get out of hand, can cause all sorts of trouble, from minor inconvenience or expense up to the loss of a vessel, if a mooring line parts some blustery night. Chafing and wear caused by undesired friction are old-time enemies of the seaman. Fortunately, there are a number of ways to combat these threats.

PROTECTION OF ROPE

The low hills of Long Island are the home of vast mining operations. The mineral is sand, used in the buildings and highways of New York. For years, countless barge-loads of sand have gone across the docks. Look at the mooring cleats and bollards on these docks, and you will find deep grooves worn in the steel from the abrasion of sand-laden lines. If the steel is that much worn, imagine what has happened to the rope involved, with sharp grains on the surface, and worked into the strands, cutting away on the comparatively soft fibers. A fiber that is cut is not only unable to pull its own share of the load, but it also loses grip on the other fibres and the added strain can cause them in turn to break, so frayed fibers greatly weaken a rope.



HOW TO WORM, PARCEL AND SERVE

However, you don't have to be in the sand business to weaken the lines on your boat. In many locations, the grit that blows aboard can settle in or be picked up by the boat's lines. Protect them by hanging them under cover when not in use, and avoid dragging them in dirt. On the dock or beach, there is every chance of picking up a load, so keep the lines off the ground as much as possible. Always carry rope—never drag it.

If a rope has been loaded with sand, shake off all you can, hose it off with fresh water, and then fake it down over a railing to dry it out. After it is dry, give it a good shaking to remove any particles which may be left. Do not use soap or detergent to wash rope—this will remove the built-in oil necessary for lubrication of the strands.

Anchor lines are particularly susceptible to wear from dirt, shells, barnacles and sharp rocks to which the lower

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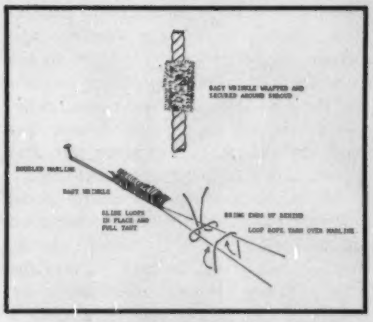
ends may be exposed. Because the anchor line can very well be the most important one on the boat, give it some extra care. First of all, do not just knot the line in the anchor ring; hauled taut against the steel and working with the surging of the boat (with or without the grinding of sand), the strands can soon chafe to the danger point. In fact, the line should not be secured to the anchor at all.

Instead, make up the anchor rode by attaching a length of chain (5 or 10 feet—the more the better) to the ring with a screw shackle, and apply a copper safety wire through the shackle-pin eye and around the body of the shackle so it cannot unscrew. Tuck an eye-splice in the end of the rope, using a thimble of the proper size. Then shackle the eye to the other end of the chain, and use a safety wire.

The chain accomplishes two purposes: it holds the anchor shank down for best bite, and it protects the fiber line from scraping over the anchor, and also from a great deal of the shell, rock (and probably cans and bottles) settled on the real estate around the anchor. Even so, the last few feet of line will be exposed to mud and dirt. On my own boat, one season gives



BAGGY WRINKLE

enough exposure to make the rope fuzzy and discolored. The cure here is to reverse the line, end for end—the weakened portion will then be at the bitter end, secured inside the boat, where it should never be called upon to do any work. Now, what about the next season when both ends of the line have become worn? If the line is manila, you're due for a new one. But with Nylon, additional life can be obtained by cutting off the few feet of frayed line and splicing in a new eye.

If a boat is to lie at anchor for any length of time (say, more than just to drown a few worms or have lunch) it is wise to protect the boat end of the line against chafe where it passes through the chock.

The usual small-boat chock is a peculiar piece of hardware. Ostensibly intended to protect the rope and to hold the line so it leads fairly from the bitts or bow cleat down to the anchor, it is more often than not a small engine of destruction. For some reason I have

(*continued on next page*)

CHARLIE M.

8

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SEAMANSHIP

(*continued from page* 139)

never seen explained, the chocks on a given-size of boat seem never to have an opening quite large enough to pass the size of line appropriate for holding the vessel. And the horns of the chock, while not exactly razor sharp, do have enough of a point and an edge often to cut a swathe through the rope fibers. Let the boat veer about all night with damaged strands working in the chock, and she may get underway without your help.

Try to fit your boat with chocks large enough to take the line, even when it is wet, without scraping or chewing. To accomplish this, you may have to work over the horns of the chock with a file, taking off sharp edges, and then have the fitting rechromed, but any steps in this direction are to your benefit. The chock opening should end up somewhat larger than necessary to pass the line.

Wear at the chock can then be reduced to a minimum by putting on chafing gear. The simplest kind is a special waterproof "chafe guard" tape which can be wound around the rope in one or more overlapping layers. Other commercial products for protection against chafe are leather and plastic sleeves, which fit snugly to the rope and are secured by lacing or lashing the ends. Rubber and plastic hose, slit down one side, slipped over the rope and then bound in place, can also be used as a home-made substitute.

The bulkier forms of chafe guard possibly may not slip readily between the points of even a "civilized" chock. In this case, with the bare rope in the chock, fit the chafing gear loosely, inboard of the chock, and then slide it along the rope until it is centered between the horns, after which it can be secured in place.

The old-fashioned method of rope protection is to "worm," "parcel," and "serve" it. This gives a very substantial covering which is particularly good on mooring lines, where it is known that the chafe will always occur at the same place. To worm, layers of tarred small stuff, called marline, are laid lengthwise of the rope between the strands. This is followed by a spiral wrapping of a narrow strip of canvas, called parceling, and then served by tightly wrapping the whole thing with marline. A special tool called a serving mallet is used to keep the outer wrapping as taut as possible. Ends of the serving are secured by tucking them through the strands of the line.

There is a never-to-be-forgotten bit of doggerel which goes with this process:

"Worm and parcel with the lay
Turn and serve the other way."

This process also has the advantage of rounding out a rope, and holding it in its intended shape, so it does not

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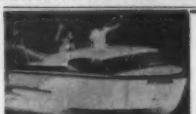

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weaken from flattening out at pressure points.

A less substantial method, but one which affords a great deal more protection than nothing at all, is just to wrap a narrow strip of canvas around the line and seize the ends in place with a wrapping of light line. A wide sleeve of canvas wrapped around the line and either sewed on or secured by a lashing will also work. Indeed, in an emergency, a heavy rag or burlap can be used. But remember that chafing gear which has slipped out of location is no more protection than none at all, so secure this stuff well.

Rope should also be protected where it rubs over railings, either on the boat or dock, or at points of contact with other cables, as in the case of a sailboat fitted with a bowsprit. A permanent mooring line will benefit from chafing protection in the eye. In addition to mooring lines, the painter of a dinghy being towed may also need protection.

On sailboats especially, lines often work in contact with other objects in the superstructure. If there is danger of wear, fit a smooth metal plate or fairlead against which the line can ride with least friction. At any points of rubbing contact, where the line is at an abrupt angle, install a roller, or use a snatch block to keep the line clear of the wear spot.

In general, avoid kinking line or subjecting it to sharp bends, since such treatment increases the internal friction and strain on the fibers on the outside of the bend. Blocks should be chosen to have room to spare for the line. Remember that line may swell when it is wet, so be sure the sheave hole in your blocks is large enough to handle this added diameter without rubbing.

PROTECTING SAILS

The canvas on a sailboat must produce horsepower, just as surely as the roaring iron monster on a powerboat. You can't expect powerful safe horses from sails that are ragged and weak, any more than you would from a clanking and corroded engine. Of course, sails eventually wear out. But you can stave off that day by protecting them from chafing and mechanical wear.

Sails are made of fiber, just like rope. Many of the same principles should therefore be followed in taking care of them. It is axiomatic that sails should be kept clean, for example. And just as in case of line, violent flexing and stretching can cause fibers to break and fray.

Excessive slatting of canvas should be avoided. Pick a calm day to dry sails, and don't let them slap around any longer than necessary—it stands to reason that with all of that noise, jerking, and commotion up there, wear is taking place.

Another cause of excessive wear is poorly fitting or rough-and-ready battens. The battens should not be just any old slat of wood, but should be carefully made about one inch shorter than the pockets, tapered at the forward ends, with rounded edges, and then smoothed to a fine finish.

On a Marconi mainsail, the topping lift is often a source of unnecessary sail punishment. This wire can flog the life out of the leach of the sail if it is left to its own devices. Slack it off to keep it clear of the leach, or even frap it in toward the mast with a length of light line.

On an offshore boat, which may have long passages before the wind, the mainsail can become chafed on the shrouds and spreaders. To avoid this, spreader tips should be padded. The pad can be a piece of sponge rubber, covered by a sewed-on boot of canvas or leather.

On the offending rigging, apply "baggy wrinkle." This is a wooly sleeve made by looping lengths of rope yarn through a doubled piece of marline. The resulting rope is wound closely around the shroud in bunches spaced just far enough apart to keep the sail out of contact with the rigging wire.

Your lines and sails are an important part of your boat. Give them the treatment they deserve by protecting them from chafing and wear. They will last longer, and you will be safer.—

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AMERICAN POWER BOAT ASSOCIATION REGATTAS

July 19—**Coeur d'Alene, Idaho** (Diamond Cup), U
Aug. 9—**Seattle, Wash.** (Gold Cup), U
Sept. 19-20—Washington D. C. (President's Cup Regatta), Unlimited
Sept. 26-27—**Madison, Ind.,** U & I (Governor's Cup)

A B P A CRUISER RACES

July 11—**Block Island, L. I., N. Y.**
July 11—**Toledo, Ohio**
July 12—**Mystic, Conn.**

SAILING RACING EVENTS CLASS CHAMPIONSHIPS

July 31-Aug. 1—Amphibi-Con. National Championship, Beverly, Y.C., **Marion, Mass.**
July 31-Aug. 2—Snipe, Junior National Series, **Lake Gibson, Okla.**
July 2—Moth Class; National Championship, **Cape May, N. J.**
Aug. 2-8—Star Class, North American Championship, **Jackson Park Y.C., Chicago.**
Aug. 3-7—Snipe, U.S. National Championship, **Lake Gibson, Okla.**
Aug. 2—Moth Class National Championship, **Michigan City, Y.C., Mich.**
Aug. 11-13—Highlander International Regatta, Raritan Y.C., **Perth Amboy, N. J.**
Aug. 15-16—Thistle Atlantic Coast Championship, **Annapolis, Y.C., Md.**
Aug. 17-22—Star World Championship, **Newport Harbor, Calif.**
Aug. 19-22—Lightning Class, International Championship, Crescent Sail Y. C., **Detroit, Mich.**
Aug. 20-22—Finn Class National Championships, **Chicago, Ill.**
Aug. 20-22—Dragon North American Championship, Columbia Y. C., **Chicago, Ill.**
Aug. 20-23—Flying Dutchman, North American Championship, **Nantucket, Mass.**
Aug. 25-27—Raven National Championship, **Cleveland Y. C., Ohio.**
Sept. 12-13—Firefly, North American Championships, Royal St. Lawrence Y. C., **Montreal, Canada.**

OFFSHORE RACES

July 4—**Trans-Pacific Y. C. Race** from Los Angeles to Honolulu
July 12—**Marblehead to Halifax Race,** sponsored by Boston Y. C. and Royal Nova Scotia Yacht Squadron

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June 27—**Huntington** Day Race
July 4—**Riverside,** Stratford Shoal
July 11—**Indian Harbor,** Ocean Race
July 17-19—**Indian Harbor,** Annual Cruise

CUP EVENTS

Aug. 28-Sept. 3—Pan American Games, **Chicago, Ill.** (Dragons, Stars, Lightnings, Flying Dutchman, Snipes, Finn Monotype, 5.5 Meters).
Sept. 14—Mallory Trophy Men's N. American Championship, Texas Corinthian Y. C. **Houston, Tex.**
Sept. 14-19—Adams Cup Finals International 210, American Y. C., **Rye, N. Y.**

MISCELLANEOUS

June 28—Eleventh Annual Milwaukee Sentinel-Winnebagoland Outboard Marathon, **Fond du Lac, Wis.**
Aug. 2-9—Seattle Seafair, **Seattle, Wash.**

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BOOKS FOR BOATMEN

Boating books may be ordered through your local bookstore.

Alone in the Caribbean; The Cruise of Diablesse; both by Frederick A. Fenger. Wellington Books. Price, $4.00 each.

Fenger made two Caribbean voyages, one through the Lesser Antilles in a 17-foot canoe; the other in a 52-foot schooner. Those two books are the reports of his trips. The first voyage, from the island of Grenada just north of Trinidad to Tortola in the Virgin Islands, involved 1500 miles of windward work in his sailing canoe *Yakaboo*. There were stops at almost every island between Grenada and Tortola, and adventures at almost every stop.

The second voyage, subject of the second book, is the voyage Fenger made with his bride a few years later. He purchased the schooner *Delna*, reduced her sail area from 1700 to 1500 square feet, and renamed her *Diablesse*. The couple sailed from Boston down the East Coast to the Caribbean; there they cruised through the islands in the midst of such events as revolutions and hurricanes. The natives of Tobago, in one instance, regarded Fenger with suspicion because (1) his first mate was a woman, (2) he wandered around town in his shirtsleeves, and (3) he was "snapshotting" about the business places. This was all brought out in an article in the local paper. It was felt that *Diablesse* was a German mine layer in disguise.

The Life and Death of the Duchess, by Pamela Eriksson. Houghton Mifflin Co., 247 pages, illustrated. Price, $4.00.

Pamela Eriksson, daughter of a former Union of South Africa Secretary for Defense, gave up a society and journalism career to go to sea. She traveled as passenger on a number of ships, and finally on the Norwegian motor vessel *Thermopylae*, she worked as an apprentice seaman in order to have something to do.

She finally wound up on the Finnish grain ship, *Herzogin Cecile*, a four-masted bark. Though again a passenger, she worked with the crew by choice—and eventually married the *Herzogin's* skipper, Sven Eriksson. This book is essentially the report of the *Herzogin's* last voyage from the Aland archipelago in the Baltic Sea to Australia, and back to England, in 1935-36. The *Herzogin* was the pride of the grain fleet, but her end came when she ran aground in a foggy night at Bolt Head, England, while proceeding up the channel. The dramatic but futile efforts to save the ship from total destruction lasted for almost two months, and are fully recorded here.

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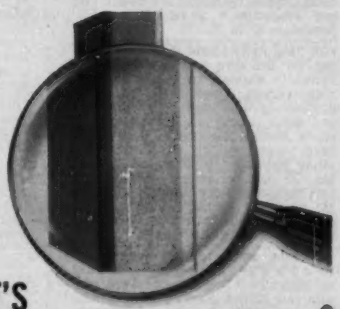

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NEW AND NAUTICAL

(*continued from page* 16)

FIBREGLASS EVERCOAT RESIN is now available in a 3-quart "Economy" can, for the convenience of boat owners using this popular quantity. Hardeners, accelerators, and colors are included or available for the new unit size. Super Bonding Resin, Finish Coat Resin and Procoat Finish Resin are also featured products. More information on this line is available from Fibre Glass-Evercoat Company, Inc., Blue Ash & Kugler Mill Roads, Cincinnati 36, Ohio.

A LIGHT FILM OIL, Lubriplate Reel and Gun Oil, now available in a clear plastic squeeze-type vial, is useful as a marine lubricant. Laboratory tests indicate that it has long life and will flow freely even at temperatures 50 degrees below zero Fahrenheit without thinning out. Lubriplate Reel Oil is used for lubricating distributor cam shafts, generators, and many other marine applications where a light anti-friction coating is needed. Lubriplate 2-C Outboard Motor Oil, Lubriplate 105, Hypoid 90 for outboard underwater gear cases, and Lubriplate Marine-Lube "A," an all-purpose lubricant, are made by Fiske Brothers Refining Co., Newark, N. J., and are available from local dealers.

A NEW BOAT TRAILER featuring a hinged-tongue design which allows the boat to be floated on and off in deep water has been introduced by Production Accessories Co., 123 East Goldengate, Detroit 3, Mich. Called the "Level Loader," the trailer eliminates tilting, as the entire bed is raised and lowered by a self-locking, worm-gear winch and cable arrangement. Individually leaf-sprung wheel suspensions and oversize tires are said to give the trailer stability and roadability when in transit, as well as maneuverability and flotation on sand and mud. Trailer takes boats up to 16′.

VITALYTE is a non-acid fluid replacement for the electrolyte in wet cell storage batteries. Developed to protect against short circuiting from sulphuric acid corrosion of lead plates, it also removes the danger of low fluid level exposing plates and burning the battery. It also increases battery life. $4.95 per bottle. Vitalyte Corp., 1055 E. 15th St., Hialeah, Fla. — ⚓

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UNIQUE Uffa Fox Designed Atalanta 26′ Sloop. Roomiest Trailable auxiliary. Sleeps 4-6. Two cabins. Self-bailing cockpit. Formica-stainless steel galley. Roller-reefing. Dacron sails. Fast, seaworthy. $9,500 fully found including 4-wheel trailer. Smith Richardson, Harbor Road, Southport, Connecticut.

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FOR Sale, fully found ready for cruising, 26′ Sea Bird type Yawl, "Stormy Petrel." Marconi rig, stainless rigging, Larsen Egyptian cotton sails. Graymarine 45HP with 2:1 reduction and $250. worth of tropical packed spare parts. Sleeps 2, galley and head. Same design as Thomas Day sailed from Boston to Italy. 18 gals. gas, 70 gals. of water. Mighty Mite dink outboard. Fully insured, 1 owner, 1st class in recent survey. $3000 firm. Apt. 2, 551 Third Ave., New York 16, N. Y. Murray Hill 4-1271.

FOR Sale, aux. cruising sloop: 30′ x 25′ x 9′ x 5′2″. Norwegian built 1939 to intern'l. 7 meter rule; powered with new British diesel engine. Sleeps 4 or 5. Fully founded for offshore cruising. Located Norwalk, Conn. Write Popular Boating Box 123, One Park Ave., New York 16, N. Y.

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PERMANENT lettering for boats, yachts, vehicles, homes, businesses—cast bronze, polished natural or chrome. Three sizes in script and three in block letters. Write for circular. Boat Names Company, 426 West 5th St., Kansas City, Mo.

FIBER Glass Boat Cloth $1.35 L. Yd., Boat Resin $6.95 Gal., 3/16″ Plexiglas $1.40 Sq. Ft., Curved Windshields $19.95. Literature 10¢. United Plastics, Rt. #130, Florence, N. J. Dept. A-1. HYacinth 9-0591.

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FOR Sale—New, used, and rebuilt marine motors—many popular makes and sizes, 2 to 550 HP, gasoline and diesel. Marine conversions and kits, reverse gears, bargains in hardware and supplies. Write for big Free Catalog 230. Stokes Marine Supply, Dept. 17, Coldwater, Michigan.

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MARINE Conversions. Ford, Mercury, Lincoln, Chevrolet V-8 etc. Free 44 page catalog. Lehman Manufacturing Company, 800 Elizabeth Avenue, Linden 6, N. J.

ENGINES—Be sure to get our new Bargain List of used and factory rebuilt marine engines. It includes 2, 4, and 6 cylinder engines, direct drive, reduction drive and V-Drive. Many excellent bargains in test models and several new 1958 models at reduced prices. Universal Motor Company, 551-A Universal Drive, Oshkosh, Wisconsin.

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RENT A Yacht—Cruise The Chesapeake. Pacemaker yachts; Sport Fisherman; Auxiliary Sail; You're the captain—complete cruising equipment $150.00-$350.00 weekly—Free brochure. Florida-Chesapeake Yacht Rentals, 3613 Hollyberry, Hampton, Virginia. Telephone Pa-2-7045.

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JOBS Overseas! Write Janecek Development Co., 109 Hub Station, New York 55, N. Y.

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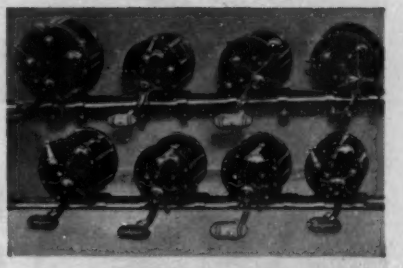

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world's No. 1 ski motor!

SKI POWER IN SIXES!

Dual 70 hp Mercury Mark 78A 6-in-line motors pull 31 skiers – a new world record! Total gross load, including skiers and their gear, plus 19-ft. towboat and crew of four, was 7,531 pounds!

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skiing with Evinrude sound-sealed power is

pure excitement!

If you think skiing is fun—try it behind a '59 Evinrude! It's the nearest thing to a breathtaking run down a snowy slope. The loudest sound you hear is the slap of skis and swish of spray! Evinrude's sound-sealed power is only a whisper in the air. For the boat driver, it's a pleasure in other ways—starts instantly, idles and accelerates smoothly, shifts easily, leaps into action at your throttle's command, has the torque to snap skiers out of water with ease, has the stamina to streak full throttle with thrill-happy skiers in tow for more hours and days and months of trouble-free service than you'd expect of any other motor.

That goes for all Evinrude skiing size motors, 10, 18, 35, or V-4 50 hp! They're all engineered with today's three most advanced motor features — thermostatic temperature control . . . sound-sealed quiet . . . and powerheads floated on rubber mounts. Best way to find out how much it adds to your skiing pleasure is to see and size them up at your Evinrude dealer (listed under "Outboard Motors" in your phone book)—better yet, make a date for a ride at the earliest opportunity. Ask for '59 full-color catalog, or write: **EVINRUDE MOTORS,** 4208 North 27th Street, Milwaukee 16, Wisconsin.

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